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POE

REPORT ON
TRANSCONTINENTAL RAILWAYS, 1883

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Ordnance Notes.--No. 345.

Washington, April 29, 1884.

REPORT ON TRANSCONTINENTAL RAILWAYS, 1883.

By Col. O. M. POE, U. S. Engineers, A. D. C. and Brevet Brigadier-General.

[ONE PLATE.]

HEADQUARTERS OF THE ARMY,
WASHINGTON, D. C., *October* 1, 1883.

SIR: In compliance with your instructions, I have prepared the accompanying paper upon the history and construction of the transcontinental railways, and incidentally referred to the past and future uses of the railway system of this country for military purposes. In the course of its preparation, I have obtained a great deal of information, which is now brought together for the first time. In its bearing upon military questions, the paper of General Gaines is one of the most interesting, because of the early date when his views were presented, and their adaptability to subsequent events. It was no ordinary mind that conceived the project proposed by him, small though the amount of his $64,000,000 may seem when compared with the $7,000,000,000 now invested in railway property in the United States alone.

Accompanying this paper is one marked F, entitled "The Pacific Railway Lines," prepared by Mr. Thomas J. Walker, of the office of the Commissioner of Railroads, in the Interior Department, which contains, in a condensed form, information of much value.

I also transmit a map, upon which the lines of "Explorations for a railroad route to the Pacific" are shown in *red*, and the lines, as constructed, in *black*, thus affording a ready means of comparison.

Except expressions of opinion, there is nothing original in the paper I have prepared. The information has been gained from many sources, prominent among which are:

"Whitney's Project for a Pacific Railroad."
"Pacific Railroad Reports." (13 vols.)
"Our Pacific Railroads." (Atlantic Monthly, December, 1867.)
"The Building of the Iron Road." (Overland Monthly, May, 1869.)
"California Overland Railways." (Overland Monthly, January, 1875.)
"The Pacific Railroad." (North American Review, June, 1879.)
"Poor's Railroad Manual."
"History of the Northern Pacific Railroad." (E. V. Smalley.)
Various Congressional reports and papers.
Manuscript information from several railroads.
Reports of the Commissioner of Railroads.

And in many instances whole paragraphs have been used just as written by their authors. This has been especially the case with portions of the report of Secretary Davis to Congress, dated February 27, 1855.

The entire transcontinental system has grown up since 1862, and all of it except the Union and Central Pacific line since 1869.

In 1854 heavy freight could be sent by sea from New York to San Francisco for $20 per ton.

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From 1872 to 1879, both inclusive, the average rate per 100 pounds per 100 miles on through freight over the Union Pacific Railroad was 8½ cents, and over the Central Pacific 10 cents. This shows that the transportation by sea was much cheaper.

But when the question concerns transportation by land alone, which is of most importance to us, the case is very different. Taking the route from Fort Leavenworth to Fort Union, for example, the average cost by wagon per 100 pounds per hundred miles for the sixteen years from 1855 to 1870, both inclusive, was $1.77, whilst by rail it is now less than a tenth of that amount. This represents the relative cost of wagon and railway transportation, bearing in mind that any variation is always such as to show more strongly the advantage of railway transportation. In some cases transportation by wagon is twenty times more costly than by railway.

Hereto attached are four tables (marked A, B, C, and D), recently prepared in the office of the Quartermaster-General, which contain valuable statistics on this point, and a table (E) prepared in the same office in 1854.

The connection of the Army with the development of the system of transcontinental railways has been direct, and the assistance rendered has been of great value, a fact which has been always admitted by those engaged in the construction. The first exploring party sent into the field for the special purpose of ascertaining the feasibility of constructing a railway on a portion of the line of one of the transcontinental routes was that under charge of Captain Warner, of the Topographical Engineers, which was organized and set in motion by orders conveyed by yourself in 1849. All the explorations from that time on until 1855, including all the present transcontinental routes, were conducted by Army officers, with the single exception of the northern route, the exploration in that case being under the direction of an ex-officer. However, all these explorations were in charge of graduates of the Military Academy, and the results of their labors prove how zealously and efficiently they were conducted.

Two of the leaders, Captains Warner and Gunnison, were killed by hostile Indians, and all endured every hardship. But it was not alone officers of the Army who gave efficient service to this work. Civil assistants were largely employed, and amongst them we find the names of many who afterwards became prominent in other directions because of the very qualities displayed by them in this work.

The explorations finished and the work of construction begun, the labors and privations of the troops were greatly multiplied. The Union Pacific (both branches), a considerable portion of the Northern Pacific, part of the Atchison, Topeka and Santa Fé, and, to some extent, the Southern Pacific railroads, were built directly in the face of hostile Indians. An enumeration of the combats with this foe would be startling in its length. The loss of life which actually occurred was far beyond what is supposed. But it was not warfare with the savages that was most trying to the soldiers; it was the necessity for constant watchfulness, the subjection to every hardship, the generally unwholesome way of living, and the feeling that the lives of many unarmed laborers depended upon them, that told most severely. It is not to be inferred that without the aid of the Army the roads could not have been built, but the work was rendered much easier and the time shorter through the assistance of the soldiers, given without extra reward, or hope of reward, beyond the feeling of satisfaction in contributing their share to the advancement of the general welfare.

I have the honor to be, very respectfully, your obedient servant,

O. M. POE,
Lieutenant-Colonel of Engineers, Col., A. D. C.,
Brevet Brigadier-General U. S. A.

General W. T. SHERMAN,
Commanding United States Army.

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REPORT.

HISTORY.

In 1830 there were 23 miles of railway in operation in this country. In 1831, 72 miles were added; 134 miles in 1832; 151 miles in 1833; 253 miles in 1834; 465 miles in 1835, and 175 miles in 1836, when the total amounted to 1,273 miles. Of this total, 630 miles, or almost exactly one half, had been built in the two years 1835–'36, and railroads and railroad matters had begun to somewhat prominently engage the attention of the people.

The tracks were composed of mere straps of iron, fastened to longitudinal string pieces, and quite incapable of heavy traffic.

The first locomotive used in the United States was constructed in England by Foster, Rastrick & Co., and imported in 1829. It was called the "Stourbridge Lion," and was intended for use upon the Carbondale and Honesdale Railroad, belonging to the Delaware and Hudson Canal Company. Though weighing but a small fraction of the weight of our present first-class locomotives, it was found to be too heavy for the track as then constructed, and was abandoned.

The first locomotive built in this country, and the second ever in use in it, was made at the West Point Foundry Works, in 1830, for the South Carolina Railroad, then in process of construction. It was named "The Best Friend of Charleston." It arrived at Charleston on the 23d of October, 1830, and was placed on the road November 2. The second engine constructed in this country was by the same establishment and for the same road. The third, also constructed by the West Point Foundry, was placed on the Mohawk and Hudson, now a part of the New York Central Railroad, in 1831. It weighed three tons, and was used on the summit between the two inclined planes. An English locomotive, weighing six tons, was imported for use at the same place, but was found to be too heavy for the track, and its use was discontinued.

Such were the engines, and such the character of the railroads in existence, when the subject of their use, for military purposes, first engaged attention, and when their extension across the continent was broached.

It would now be impossible to ascertain who was the first to suggest the construction of a railway to connect the eastern portion of our country with the Pacific coast. It is probable that the idea in some form occurred to several persons. Very recently, Mr. E. V. Smalley, in his "History of the Northern Pacific Railroad," has presented the claim of Dr. Samuel Bancroft Barlow, of Granville, Mass., to this distinction, details the evidence upon which the claim is founded, and shows that as early as 1834 (possibly in 1833) Dr. Barlow advocated the construction of a railroad from New York to the mouth of the Columbia River, by direct appropriations from the Treasury of the United States. But in presenting this claim to priority, is it not possible that the fact has been overlooked that Dr. Barlow's paper in the Intelligencer (of Westfield, Mass.) was called forth by a series of articles upon the same subject, published in the Emigrant, of Washtenaw County, Michigan Territory? And is not, therefore, that unknown writer of those articles really entitled to whatever credit attaches to priority of suggestion?

In 1836 John Plumbe, a Welshman by birth, an American by education and feeling, a civil engineer by profession, at Dubuque, Iowa, called the first public meeting for the purpose of agitating the subject of building a transcontinental railway. From that time until his death, in California several years afterwards, he was an ardent advocate of the project. When Plumbe first broached his project at Dubuque there were scarcely any railroads, and in the States west of the Ohio only sparse settlements. Not one line of railroad had been finished between the Atlantic and the great interior basins. The population, business, and internal improvements of the United States were confined to a region from Canada to the Gulf, scarcely 1,000 miles wide; and west of that lay 2,300 miles of vacant territory, which must be traversed to realize the dream of a Pacific railroad; and our possessions upon the Pacific were limited to an inconsiderable portion of the coast,

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occupied by a feeble colony. So far as we can now ascertain, Plumbe's project had in view the development of the country, and the advancement of our commercial interests. It was not discussed with reference to its bearing upon military questions. But there were other minds which foresaw the important relations which railroads in the future would have to military operations.

The proposition must have seemed to most people chimerical in the superlative degree, but it produced fruit. In 1837 Dr. Hartley Carver published in the New York Courier and Enquirer an article advocating the construction of a Pacific railroad. The discussion of the subject, limited though it was, gradually secured adherents, until we find the matter referred to in the Senate of the United States in the session of 1842–'43, whilst the "Oregon question" was under consideration, when Senator Sevier held that not only lands should be granted to settlers, and forts built and garrisoned for their protection, but if necessary a railroad should be made from the Missouri to the Columbia, over which immigrants might be conveyed in two or three days. Senator Linn dwelt upon the facility with which travel and transportation might be effected across the continent, "by means of ordinary roads at present and by railroads hereafter."

Senator McDuffie opposed these projects for the encouragement of settlers, and ridiculed the idea that steam could ever be employed to facilitate communication across the continent between the Columbia countries and the States of the Union.

In the spring of 1844 Mr. Asa Whitney embarked from China for New York, under the determination to devote his life to the work of establishing a means of cheap and easy communication across our continent, between the 250,000,000 of European population on one side of us and all Asia with its 700,000,000 of people on the other, believing that it promised much good to all mankind, not doubting that in due time he could satisfy his countrymen of its feasibility and vast importance, and gain their assent to its accomplishment.

At the second session of the Twenty-eighth Congress (*i. e.*, in the winter of 1844–'45) he memoralized Congress upon the subject. His memorial was referred to a committee in each House, and it was favorably unanimously reported upon, the Hon. Stephen A. Douglas being one of its advocates in the House of Representatives.

In 1845 he examined, on his own account and at his own expense, more than 800 miles of the route, as well as 1,500 miles of the Missouri River and other streams, to ascertain where they could be bridged, the facilities which the country might afford, and the value or availability of the lands; Colonel Frémont in person and the statements of others had satisfied him of the feasibility of the whole route.

At the beginning of the first session of the Twenty-ninth Congress (December, 1845) he again presented a memorial in regard to the matter, which was referred to the Senate Committee on Public Lands (Mr. Breese, chairman, Mr. Woodbridge, Mr. Morehead, Mr. Ashley, and Mr. Chalmers). The chairman prepared a report, which was unanimously adopted by the committee and reported to the Senate, together with a bill to carry out the project. (The proposition had gained much strength in the three years which followed the discussion of the "Oregon question.")

During the first session of the Thirtieth Congress (March 17, 1848) he again presented a memorial, which was referred to a select committee in each House. The House committee reported a bill to carry the project into effect. A bill (not identical) was also reported by the Senate committee. In each case the action of the committee was unanimous. (The favorable sentiment had increased.) But the Senate bill was laid on the table by the close vote of 27 to 21, and the House did not reach its bill. Mr. Pollock, from the House select committee, used the following language:

> The proposition, at first view, is a startling one. The magnitude of the work itself, and the still greater and more magnificent results promised by its accomplishment, that of revolutionizing, morally and commercially, if not politically, a greater part of the habitable globe, and making the vast commerce of the world tributary to us, almost overwhelms the mind. But your committee, on examination, find it a subject as simple as it is vast and magnificent, and see no insurmountable difficulties in the way of its successful accomplishment.

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The short session, beginning in December, 1848, was occupied with other matters, which were considered, at the time, of more pressing moment.

To Mr. Whitney undoubtedly belongs the credit of having first formulated a practicable scheme for the construction of a transcontinental railway. When he began his active work in connection with the project our Oregon possessions were all we controlled on the Pacific coast, and the location of the western terminus was limited accordingly. His eastern terminal point was at Saint Joseph, on Lake Michigan. Two and a half years afterwards, when he presented his third memorial, we were in possession of all the coast from the Straits of Fuca to San Diego, and the western terminus might be anywhere within those limits.

Mr. Whitney asked the aid of Government to the extent of a sale to him of public lands, at a reduced price, for 30 miles on each side of the located line. The House bill fixed 10 cents per acre as the price to be paid by Mr. Whitney.

In the fall of 1849 "a Pacific railroad convention met at Saint Louis, and was presided over by Stephen A. Douglas. * * * Whitney's last map, as shown to this convention, marked out a route from Chicago by way of Prairie du Chien, Council Bluffs, and the South Pass, to Snake River, down that stream to Fort Walla Walla, and thence across the Cascade Mountains to Fort Nisqually, on Puget Sound." J. Loughborough, a Saint Louis lawyer, presented, as a compromise, a project for a line "from Independence, Mo., to the South Pass, and thence by way of the Humboldt River to California, with a branch to Oregon and termini at Yaquina Bay, Fort Vancouver on the Columbia, and Fort Nisqually on the Sound."

The Saint Louis convention condemned Whitney's project.—(*Smalley.*)

About 1847 Dr. Carver also memoralized Congress. He found Mr. Whitney already upon the ground and actively pushing his views. Although the time was not ripe for the adoption of a national measure so grand in its scope, and statesmen regarded their schemes as the dream of enthusiasts, rather than the coolly conceived project of great minds, yet their arguments were not fruitless. Constant and rapid accessions of support were gained, until the measure was defeated in 1848 by only a bare majority. The time had passed for men to ridicule such a proposition, and the defeat of the bill can only be attributed to the magnitude of the project. Legislators were timid, not unbelieving. The country did not yet realize the immensity of its resources, and the proposed national aid, if rendered, would make a serious drain upon them. A considerable number of our legislators, at that time, were of opinion, too, that the Constitution did not warrant such an application of the public domain. Notwithstanding all this, the legislatures of nineteen States passed resolutions in favor of the adoption of Whitney's plan. In most of these cases the vote was unanimous, or nearly so, and in the others the favorable majority was large.

By the treaty of Guadalupe Hidalgo, signed on the 2d of February, 1848, the war which had existed between the United States and Mexico for nearly two years was terminated, and that portion of the Mexican province of California comprised between the southern boundary of Oregon and a point just south of the post of San Diego was ceded to the United States. Almost simultaneously with this came the discovery of gold at Sutter's Mill, within this ceded territory. The fact soon became known to the world, and a vast number of the most earnest adventurers, and enterprising men from the rest of our own, and even from foreign countries, started in search of fortune. Some portion of this migration reached California in the latter part of 1848, but it was not until 1849 that the great influx arrived. By whatever route they came, much time was consumed, and every hardship endured. Thousands never lived to complete the journey. The difficulties and dangers of all the lines of communication with the outer world were so manifest to them, that almost with the first arrivals appeared a determination to secure improvement in this regard, and, as a consequence, on the 13th of August, 1849, a party under the direction of Capt. W. H. Warner, Corps of Topographical Engineers, United States Army, under instructions conveyed to him by Lieut. (now General) W. T. Sherman, left Sacramento, Cal., intending to survey as far as Humboldt River, for the pur-

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pose of finding a practicable railroad route through the Sierra Nevada. While engaged upon this duty on the 26th of September, 1849, Captain Warner was killed by Red River Indians on the eastern side of the Sierra Nevada. His notes and other papers were preserved, however, and subsequently used. They extended as far as Goose Lake. He was accompanied upon this exploration by Lieutenant Williamson of the same corps.

The instructions by the Department of State, to the commissioner, for running and marking the boundary line between the United States and Mexico, under the treaty of Guadalupe Hidalgo, directed an examination of the country contiguous to the line to ascertain its practicability for a railway route to the Pacific. The boundary, as agreed upon by the two commissioners representing the two countries, fixed the initial point in the Rio Grande in latitude 32° 22′, instead of a point as laid down on the treaty map, about 8 miles above El Paso. This was disapproved by the astronomer and surveyor on the commission at the time, and was eventually repudiated by the Government. The boundary line, as finally determined and established under the treaty of Guadalupe Hidalgo, extended up the Rio Grande from its mouth to latitude 31° 54′ 40″ north; thence west along that parallel to the meridian of 109° 37′ west; thence due north to the Rio San Domingo; thence down that stream to the Gila; thence down the Gila to its mouth; thence in a straight line to the point on the Pacific in latitude 32° 32′ north (Warren). This treaty, entered into in 1848, at the close of the war with Mexico, was made before the agitation of the subject of a transcontinental railway had become so prominent, yet the question received some consideration, as by Article VI it is provided that

> If, by the examinations which may be made, it should be ascertained to be practicable and advantageous to construct a road, canal, or railway which should in whole or in part run upon the river Gila, or upon its right or its left bank, within the space of one marine league from either margin of the river, the Government of both republics will form an agreement regarding its construction, in order that it may serve equally for the use and advantage of both countries.

The people of the southern portion of our country soon appreciated the necessity to them of a line as far south as the boundary would admit of. A slight inspection of recent maps will show that the boundary adopted was such as to make the construction of a railroad within it, but in its immediate vicinity, a work of great difficulty, whilst just south of it the mountains generally drop into the plain with easy passes through the remaining ridges in fact, as we now know, affording the easiest route from the Rio Grande to the Pacific.

As soon as these facts became known, negotiations were instituted for the purchase from Mexico of additional territory, resulting in what is generally known as the Gadsden purchase. Under this it was agreed that the boundary line should leave the middle of the Rio Grande,

> Where the parallel of 31° 47′ north latitude crosses the same; thence due west 100 miles; thence south to the parallel of 31° 20′ north latitude; thence along the said parallel of 31° 21′ to the one hundred and eleventh meridian of longitude west of Greenwich; thence in a straight line to a point on the Colorado River 20 English miles below the junction of the Gila and Colorado Rivers; thence up the middle of the said river Colorado until it intersects the present line between the United States and Mexico.*

All the other parts of the boundary line remained as provided in the treaty of Guadalupe Hidalgo. For this modification of the boundary the United States paid to Mexico the sum of $10,000,000, and acquired the coveted Mesilla Valley route over which the Southern Pacific Railroad has since been constructed.

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*1846–'47 Maj. W. H. Emory, of the Corps of Topographical Engineers, United States Army, had passed over the region in question, from the Rio Grande to the Pacific Ocean, and gained much information in regard to its physical characteristics. Very early in 1849 he sailed for San Diego, Cal., to assist in running and marking the boundary line between the two countries, as established by the treaty of Guadalupe Hidalgo. Whilst crossing the Isthmus of Panama he seems to have had experience of such a character as to impress upon him the vital importance to us of a railroad to the Pacific. He was acquainted with the instructions of our Government to its commissioners, and feared that the initial point of the boundary would not be located sufficiently low down on the Rio Grande to secure a practicable railway route on our side of the line. Consequently, upon his arrival at San Diego, he wrote to the Secretary of the Interior, under date of April 2, 1849, as follows, viz:

* * * "The inaccuracy of the maps upon which the treaty was made, and which thereby became a part of the treaty, is notorious. It is also known to all who have been much in the frontier States of

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In 1850 William B. Ogden, of Chicago, convinced of the practicability of a transcontinental railway, gave the aid of his powerful influence to the agitation of the measure.

In 1851 Senator Gwin gave notice in the Senate of the United States of a bill for the construction of a Pacific railroad, and in 1852 Senator Stephen A. Douglas, chairman of the Committee on Territories, reported a bill on the subject.

With constant accessions of support from far-seeing and liberal-minded men, capitalists, statesmen, and soldiers, the movement finally gained such momentum as to compel the Government to take action, and by making the necessary appropriation provide for beginning that magnificent series of explorations and surveys, which continued by subsequent appropriations, and aided by all the power of an enlightened executive, exercised through the military organization, was carried on for two years, and furnished so much valuable information. By this time the public mind was thoroughly aroused, and the publication of information was demanded. The result was that the publication of the thirteen quarto volumes known as the "Pacific Railroad Reports" was ordered by Congress, at an expense of hundreds of thousands of dollars.

The lines covered by these explorations have since been practically occupied by constructed roads. Their connection with this desirable result has been so direct and so important, that it is deemed proper to give them in some detail.

EXPLORATIONS AND SURVEYS FOR A RAILROAD FROM THE MISSISSIPPI RIVER TO THE PACIFIC OCEAN.

The first appropriation for this purpose was made by the tenth section of the act making appropriations for the support of the Army, approved March 3, 1853. By acts of May 31, 1854, and August 5, 1854, further sums were appropriated, aggregating in all $340,000. This was exclusive of such aid as could be given, without special appropriations, through the resources of the War Department, which must have more than doubled this aggregate.

The explorations and surveys covered five belts, usually referred to as: 1. The route near the forty-seventh and forty-ninth parallels. 2. The route near the forty-first and forty-second parallels. 3. The route near the thirty-eighth and thirty-ninth parallels. 4. The route near the thirty-fifth parallel. 5. The route near the thirty-second parallel. And they disclosed the fact that all the routes were practicable for the construction of a railway.

The following brief description of these several routes is largely taken verbatim from the final report of Hon. Jefferson Davis, Secretary of War, to Congress, dated February 27, 1855. In the endeavor to condense as much as possible much matter of general interest has been omitted, and only that used which describes the several lines. Those wishing to read the report itself will find it in the first volume of the Pacific Railroad Survey Reports.

For convenience the several routes will be given in their geographical order, beginning with the northernmost, and in order to complete the history the account in each case will be carried through to the completed road.

ROUTE NEAR THE FORTY-SEVENTH AND FORTY-NINTH PARALLELS.

This route "was to cross the Rocky Mountains at the sources of the tributaries of the Missouri and Columbia Rivers, and, in approaching and leaving the mountains, to follow as far as practicable the valleys of these rivers and their tributaries." The general direction of the requisite explorations was intrusted to Governor Isaac I. Stevens, of Washington Territory, late of the Corps of Engineers, United States Army.

Mexico that the boundaries of those States have never been defined on the ground, and are unknown. This is particularly the case of the boundary betwixt New Mexico and Chihuahua. In this condition of things the commissioners must negotiate, and they may adopt the thirty-second parallel of latitude until it strikes the San Pedro, or a more southern parallel of latitude. This would give what good authority, combined with my own observations, authorizes me to say is a practicable route for a railroad." * * *

It afterwards appeared that if this communication had been promptly acted upon, it "would have been the means of saving much controversy and expenditure of time and money."

Is it possible that it would have saved the whole Gadsden (or Mesilla Valley) purchase?

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Beginning at Saint Paul the route passed up the Mississippi River on its eastern side to Little Falls, 109 miles, where it crossed, and gaining the divide between the waters of Hudson's Bay and those of the Missouri, kept on this divide, and in longitude 103° W. approached within a few miles of the forty-ninth parallel; then passed southerly between the one hundred and fourth and one hundred and fifth meridan, and entered the valley of the Missouri River, which it followed to the mouth of Milk River; thence up the valley of Milk River 187 miles, when it entered the prairies, continued along a line nearly parallel with the river across its tributaries, the Marias, Teton, and Sun Rivers, and entered either Clark's or Cadotte's Pass.

Thus far no portion of the route offered any great difficulty to the construction of a railroad. But from the Sun River to the Spokane, a distance of 365 miles, embracing the Rocky Mountains proper and a secondary chain lying west of them (called Cœur d'Alene, and the Bitter Root Mountains), serious obstacles were encountered.

Seven passes were explored through the Rocky Mountains, but it was only at two of them (Clark's and Cadotte's) that the information obtained was sufficiently complete to enable projects to be made. They lie near each other in latitude 47°, and connect the headwaters of Dearborn River, a tributary of the Missouri, with those of the Blackfoot, a tributary of the Columbia.

The route by Clark's Pass required a tunnel of 2½ miles in length, at an elevation of 5,300 feet, with approaching grades of 50 feet to the mile. That by Cadotte's Pass involved a tunnel 4½ miles long, at an elevation of 5,000 feet, with grades of approach of 60 feet. The former pass was the one considered in making the estimate.

From either pass the route sought the Blackfoot River in order to reach Clark's Fork, and two routes were examined. The first followed the Blackfoot to its junction with Hell Gate, a distance of 93 miles, then by the Hell Gate to its junction with the Saint Mary's, called below this junction the Bitter Root, and thence to Clark's Fork.

The other and shorter route followed the Blackfoot but a short distance, crossed to the Jocko, descended this to the Flathead, and the last to its junction with the Bitter Root, forming Clark's Fork. It continued along Clark's Fork to Lake Pend d'Oreille, which it left at the lower extremity, and without difficulty crossed to the Spokane. At the Spokane River the continuous mountain region and the forest terminate, and all great difficulties of location upon the route ceased.

Concerning the passes of the Rocky Mountains Governor Stevens remarked:

> It is not doubted there are other passes in this portion of the Rocky Mountain range even better than those explored; they are indicated by the general depression of the mountain range, with the greater frequency of the streams stretching out to meet each other from the opposite slopes of the mountains; and I consider it important that in future operations a whole season should be devoted to their thorough examination, and that instrumental surveys should be made of the pass found to be the most practicable.

Leaving the Spokane, the route entered the great plain of the Columbia and crossed it in a distance of 110 miles. At a distance of 140 miles from the Spokane a suitable point for crossing the Columbia was reached. This point was about equally distant from the navigable waters of the Pacific in Puget Sound, and in the Columbia River, the whole intermediate space being occupied by the Cascade Mountains, with but two passes reported practicable for a railroad, that of the Columbia River and that of the Yakima.

In the opinion of the officer who examined it, Capt. George B. McClellan, of the Corps of Engineers, United States Army, Yakima Pass was barely practicable, at a great cost.

The route by the pass of the Columbia followed that river from the great plain, being generally located as far as The Dalles in bottom lands, which presented no difficulties. From The Dalles to near Vancouver, 90 miles, the route was less easy, but deemed quite practicable.

The Columbia River is navigable for sea-going vessels to Vancouver, but because of the unfavorable character of the entrance, and the great superiority of

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the ports on Puget Sound, it was deemed expedient to adopt one of the latter as the Pacific terminus of this route. Therefore the route was continued without difficulty down the Columbia to the mouth of the Cowlitz, then up the valley of that stream and across the intermediate country to Seattle, on the east side of Puget Sound.

The principal favorable characteristics of this route were its low profile, low grades, the low elevation of the mountain passes, and its connection with the Missouri and Columbia Rivers. The principal unfavorable features were in construction; the tunnel required on the Rocky Mountains, and the difficulty and expense of construction from the eastern approach of the Rocky Mountains to the Spokane River, and the expense of the construction along the Columbia River from The Dalles to near Vancouver.

The severely-cold character of the climate throughout the whole route, except the portion west of the Cascade Mountains, was considered one of its unfavorable features; and, strange to say, its proximity to the dominions of a powerful foreign sovereignty was deemed a serious objection to it as a military road. (These views were advanced in 1855 by Hon. Jefferson Davis, then Secretary of War. Could there have been any stronger argument in favor of this route as a military highway than its proximity to the dominion of a single foreign sovereignty from the great lakes to the Pacific?)

Governor Stevens estimated the cost of a railroad from Saint Paul to Seattle, by the Columbia River Valley and the Cowlitz, at $117,121,000. The Secretary of War thought it safer to increase this estimate to $150,871,000, but added:

> Should Governor Stevens have included a full equipment in his estimate, $10,000,000 should be subtracted from this sum to bring the estimate in accordance with those of the other routes, and the cost then becomes $140,871,000.

The length of the route from Saint Paul to Vancouver was 1,864 miles, with sum of ascents and descents, as far as reported, of 18,100 feet, giving an equated length of 2,207 miles.

From Saint Paul to Seattle, by the Columbia route, was 2,025 miles, with an equated distance of 2,387 miles.

THIS ROUTE AS OCCUPIED.

This route has been occupied by the Northern Pacific Railroad, which, however, departs more from the route laid down by the exploring party than does either of the others. The fact must not be overlooked, however, that the Yellowstone Valley was examined. From the west end of Lake Superior two lines, each of about 24 miles in length, join at Northern Pacific Junction, and thence continue over the same track to Brainerd, where the line is joined by a railroad proceeding from Saint Paul; thence continuing westerly it crosses at Glyndon a line of railway from Saint Paul to Winnipeg, Manitoba, and at Jamestown sends off a branch to the northwest (branches to the south or southwestward are not considered), toward the southerly bend of Mouse River. Crossing the Missouri at Bismarck it reaches the Yellowstone at Glendive; then following up the south bank of the Yellowstone it crosses it but few times, and finally leaves it a short distance west of Shield's River, and crossing the mountain at Bozeman Pass by a tunnel 3,610 feet long at an elevation of 5,565 feet, descends into the valley of the Gallatin (one of the branches of the Missouri) through Rock Cañon, and by a very direct route reaches the main chain of the Rocky Mountains at Mullan Pass, where it crosses by means of a tunnel 3,850 feet long at an elevation of 5,547 feet, or 18 feet less than that at Bozeman Pass. This pass is the one referred to by Governor Stevens, in his report, as not explored by him, but likely upon examination to prove better than either of the two passes which he did explore. It then continues down the Little Blackfoot to its junction with the Deer Lodge (the resulting stream being called the Hell Gate), thence along the Hell Gate to its junction with the Bitter Root (or Saint Mary's). Here it intersects one of the explored lines, and becoming coincident with it pursues that route through the Coriacan Defile and along the Jocko to its junction with Clark's Fork of the Columbia, thence

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down that stream, and passing the northerly end of Pend d'Oreille Lake continues to follow the explored route via Spokane Falls and old Fort Walla Walla (now Wallula) to Portland, and thence via the Cowlitz Valley to Puget Sound at Tacoma.

In 1852 Mr. Edwin F. Johnson, an engineer of high reputation, warmly advocated the construction of a line of railroad along the northern route. In 1853, some years before the results of the Government explorations became generally known, he published a map and profile indicating a line from Chicago, with a branch from the head of Lake Superior joining it at what is now Breckenridge, on the Red River of the North, "crossed the plains to the Missouri, followed the north bank of that stream and the Dearborn River to the mountains, thence ran to Flathead Lake and Fort Colville, and ended at Bellingham Bay, on Puget Sound." This map had for its basis the results of the expedition of Lewis and Clarke, and was remarkably accurate in view of the fact that no instrumental data were available for its construction.

But it was mainly to Governor Isaac I. Stevens that the country is indebted for the legislation that resulted in the building of the road. Being in Congress as a Delegate from Washington Territory, he had many opportunities to forward the interests of the project unavailable to others. He was earnest and zealous in his advocacy, and his personal influence with his fellow members such as to secure him a respectful hearing, thus enabling him to properly present a strong array of facts coming within his own knowledge. Except for his early death upon the battle-field, he would undoubtedly have taken a prominent part in the ultimate construction of the road.

The Northern Pacific Railroad Company was incorporated by an act of Congress approved July 2, 1864, entitled "An act granting lands to aid in the construction of a railroad and telegraph line from Lake Superior to Puget Sound, on the Pacific coast, by the northern route."

By this act the company was empowered to build a line of road from some point on Lake Superior, in the State of Wisconsin or Minnesota, west on a line north of the forty-fifth degree of latitude, to a point on Puget Sound, with a branch to Portland, Oreg. It required the company to commence work within two years; to complete not less than 50 miles a year after the second year, and to finish the entire road by July 4, 1876. The land-grant was twenty sections to each mile of track in the States of Minnesota and Oregon, and forty in the Territories; and a vicious section was added to the effect "that all the people of the United States shall have the right to subscribe to the stock of the Northern Pacific Railroad Company until the whole capital named in this act of incorporation is taken up by complying with the terms of subscription, and no mortgage or construction bonds shall ever be issued by said company on said road, or mortgage or lien made in any way, except by the consent of the Congress of the United States," only to be repealed in 1870.

The conditions of the act were accepted by the company December 15, 1864, and on the 17th the President of the United States was notified thereof. This notification was acknowledged by the Department of the Interior on the 30th.

On the 9th of March, 1865, the Secretary of the Interior acknowledged receipt of a map, upon which was delineated the general line of the Northern Pacific Railroad as adopted by the Board of Directors of that company, and a letter dated on the 6th of the same month requesting that the granted lands along the line be withdrawn from market.

Meanwhile but little progress was made towards beginning construction. Edwin F. Johnson was appointed chief engineer of the road in May, 1866. Systematic surveys at both ends of the road were begun in the summer of 1867, and the first general report of the chief engineer was made in November, but it was not until April, 1869, that the reports of the engineers in charge of the surveys at the two ends were ready for presentation, and no report was made to the Board of Directors until 1870, for the reason that there was no meeting between February, 1868, and February, 1870 (History Northern Pacific Railroad, page 160). By joint

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resolution of Congress of July 1, 1868, the time for beginning the work of construction was extended two years, and for completion one year, or from July 2, 1868, to July 4, 1877. Another joint resolution, approved March 1, 1869, granted the consent of Congress to the issue of bonds secured by mortgage upon the railroad and telegraph line, and defined the term "Puget Sound." An act of Congress approved April 10, 1869, authorized the "extension of its branch line from a point at or near Portland, Oreg., to some suitable point on Puget Sound, to be determined by said company," &c., and required the construction of at least 25 miles of the extension before July 2, 1871, and 40 miles per year thereafter.

By joint resolution of May 31, 1870, the company was authorized to issue its bonds, secured by mortgage upon "its property and rights of property of all kinds and descriptions, real, personal, and mixed, including its franchise as a corporation." It also authorized the location of the line via the valley of the Columbia River to connect with the branch line to Puget Sound; increased the land grant, and required the use of American iron or steel in the construction of the road.

The history of the financial operations of the company now becomes interesting, but, being entirely foreign to the purposes of this paper, is omitted, as it will be generally in speaking of the other roads.

Construction work upon the road began in the summer of 1870. "Detailed surveys were completed during the spring from Thomson's Junction to the crossing of the Mississippi River, where a town was laid out and named Brainerd."

In April a controlling interest in the Saint Paul and Pacific Railway Company was obtained.

This company had a considerable land grant, and was organized to build a system of roads extending from Saint Paul to the British line at Saint Vincent, and also to Breckenridge, on the Red River, and to Brainerd.

During the financial embarrassments of the Northern Pacific Company they sold this stock; the company went into bankruptcy, was reorganized under the name of the Saint Paul, Minneapolis and Manitoba Railroad Company, and now competes with its former owner for much of the traffic of the Red River region.

The East Minnesota Division of the Northern Pacific Railroad extends 114 miles from Duluth to Brainerd, where it joins the Saint Paul Division of 136 miles in length, the continuation of both lines being known as the West Minnesota Division, extending to Fargo, 138 miles. Ground was first broken on this division on the 15th February, 1870, at a point about a mile west of the present town of Northern Pacific Junction, where the Saint Paul and Duluth Railroad (then called the Lake Superior and Mississippi Railroad) joins the Northern Pacific. The Lake Superior and Mississippi Railroad was opened through from Saint Paul to Lake Superior in the summer of 1870, and became the supply line for the construction of the Northern Pacific, which acquired a half interest in the 23 miles of road from the junction to Duluth.

The work of construction went bravely on, but it was not until November 21, 1871, that a map of definite location of a part of the main line was filed in the General Land Office, "from a junction with the Lake Superior and Mississippi River Railroad in Sec. 7, T. 48 N., R. 16 W., Minnesota, to the Red River of the North." The affidavit of the chief engineer of the company, showing the completion of the road to the Red River, 228 miles, was filed in the General Land Office October 5, 1871. Of this distance the portion from Northern Pacific Junction to Brainerd, 91 miles, was built in 1870, and the remaining 137 miles in 1871.

It was not until August, 1871, that the location of the crossing of Red River was finally settled. It was determined by the nature of the approaches. A town was laid out upon either bank, that upon the east being named Morehead, the other Fargo.

The Dakota Division begins at Fargo and extends 200 miles to Mandan, on the west bank of the Missouri. The work of construction was begun in the spring of 1872, and by the end of the season the track had reached Jamestown, a distance of 94 miles. During the spring and summer of 1873 the track, crossing the Coteaux at an elevation of 1,850 feet above the sea, reached the east bank of the

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Missouri, 102.4 miles further, where a town was laid out and called Bismarck. The affidavit of the chief engineer, testifying to the completion of the road to the Missouri, 196.4 miles, was filed in the General Land Office October 7, 1873. The division was operated at a loss during the first winter, and during the second trains were only run as far as Jamestown.

The financial condition of the company now became so low that the road advanced no further until 1878. The connection with the Missouri River navigation was of great importance, however, not only to the road itself, but in greater degree to the people who were beginning to settle the country to the north and west of Bismarck, as well as to the Government posts and Indian agencies on the Upper Missouri and Yellowstone, and even the remote mining towns in Montana.

The Missouri Division extends from Mandan to Glendive, on the Yellowstone, a distance of 216 miles. Its construction was begun early in 1878, advantage having been taken of the ice-bridge in the winter to lay a track over it and transport a large quantity of materials in readiness for the season's work.

From Mandan to Fryburg, a distance of 136 miles, the work was light, except the construction of the numerous bridges across the Heart River and its tributaries. From Fryburg to Beaver Creek, a distance of 30 miles, the line crossed the Bad Lands, and some difficulties were encountered, arising principally from the distance from the base of supplies and the frequent presence of hostile Indians in the vicinity. From Beaver Creek, down Glendive Creek to the Yellowstone, the route was easy. The chief engineer's affidavit of completion to the Little Missouri, 150 miles, was filed in the General Land Office September 3, 1880, and to a point about nine miles west of Glendive (near Iron Bluff), a further distance of 75 miles, on July 20, 1881, though the track had actually reached that point some time before. The end of the road was now about 700 miles west of Duluth, on Lake Superior, and was complete, except as to the bridge across the Missouri River between Bismarck and Mandan.

The Yellowstone Division extends from Glendive to Billings, 225 miles, the road ascending the Yellowstone by its south bank until within two miles of the latter point, when it crosses to the north bank.

Work began on this division in the spring of 1881, and was pushed with great vigor, reaching Billings by midsummer. The chief engineer's affidavits show the following results as accomplished:

	Miles.
April 17, 1882	100
July 11, 1882	25
July 24, 1882	25
August 10, 1882	25
August 25, 1882	25
October 27, 1882	50
November 9, 1882	25
November 28, 1882	25
November 28, 1882, bridge over the Missouri	4.6
Total	304.6

The last-named item given above comprises the bridge across the Missouri at Bismarck, a work of much difficulty. The site of the bridge was fixed in July, 1880, and ground was broken for its construction in May, 1881, and it was formally opened for use October 21, 1882, though not certified until nearly a month later. The road was now continuous from Duluth westward a thousand miles. The season's work had carried the road well over into the adjoining division, to a point called Livingston, 115 miles west of Billings.

The Montana Division is comprised between Billings and Helena, a distance of 239 miles. The road crosses the Yellowstone at a point 37 miles west of Billings, and recrosses to the north side at Livingston, where it leaves the valley of the Yellowstone and begins the ascent of the Belt Range, rising 1,052 feet, to Bozeman Pass, in a distance of 12 miles, with maximum grades of 116 feet to the mile. It crosses the Pass by a tunnel 3,610 feet long at an elevation of 5,565 feet above sea-level, or 18 feet higher than the summit of the tunnel through the main chain

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of the Rocky Mountains at Mullan Pass. The descent westward from Bozeman tunnel is easily made by way of Rock Cañon, with maximum grades of 116 feet for a portion of the distance, and thence proceeding down the valley of the East Gallatin, crosses the Missouri and reaches Helena.

Work was begun on Bozeman tunnel February 11, 1882, almost simultaneously with the commencement of work on the division at Billings. To avoid delay in track laying west of the Pass, a temporary track 2½ miles in length, with grades of 220 feet, was laid across the divide, and the road carried forward steadily during the winter of 1882–'83, except when interrupted by short periods of extremely cold weather. The track reached Bozeman on the 14th of March, 1883, and the first passenger train arrived there, amid great rejoicing, on the 21st. In June the road was completed to Helena, 1,132 miles west of Duluth, with the exception of Bozeman tunnel, which will probably be completed by the close of the year.

The Rocky Mountain Division extends from Helena to Heron, a distance of 274 miles.

The route via Mullan Pass was adopted in 1881, but was not formally approved by the Department of the Interior until May, 1883. Construction was begun on the division at Mullan tunnel (through the main Rocky Mountain range) December 14, 1881, and is not yet completed, but soon will be. It is 3,850 feet long, and at the highest point 5,547 feet above the level of the sea.

From Helena the line follows the narrow valley of Seven-Mile Creek, and up Greenhorn Gulch to the Pass, with maximum grades of 116 feet, then descends the Little Blackfoot to its junction with the Deer Lodge, then down the Hell Gate to Missoula, and through the Coriacan Defile to the Jocko, down that stream to the Flathead River, and down that to its junction with Clark's Fork of the Columbia, which it descends.

As far as the valley of the Little Blackfoot, about 30 miles west of Helena, the road was built from east towards the west, reaching that point on the 22d of August, 1883, and was there joined by the other portion, built eastward from Wallula, on the Columbia, where it is joined by the main line of the Oregon Railway and Navigation Company coming from Portland.

The Pend d'Oreille Division begins at Wallula and ends at Heron, a distance of 269½ miles. It extends in a generally northeastern direction across the great plains of the Columbia, around the north end of Lake Pend d'Oreille, and along Columbia River until it meets the division to the eastward.

A small amount of work was done on the division in 1879, but it was not until the spring of 1880 that operations were pushed with vigor.

During that year the grading was completed to Rathdrum, 189 miles, and track was laid from Wallula to the south bank of Snake River, and from Ainsworth, on the north bank of that stream, 48 miles further, to Twin Wells. At the close of the season the grade was 124 miles in advance of the track. * * * The crossing of Snake River is at present effected by a transfer-boat.

A bridge is in course of construction, and its completion expected in 1884. In length it will be next to that at Bismarck.

The road was easy of construction until it approached Lake Pend d'Oreille, when the country becomes much broken. Much trestle-work is used, one stretch being 8,400 feet long, and the aggregate amounting to nearly three miles.

The most difficult portion of the whole line to construct was that between Sand Point, on Lake Pend d'Oreille, and the crossing of the Flathead, one of the principal obstacles being the density of the forests and the size of the trees. Most of the work through the woods and swamp along the lake shore was done in the winter of 1881–'82. At times thousands of men "were engaged in shoveling the snow from the line in order that the grading and track-laying might proceed." Some blasting of rocks upon an enormous scale was done, and in the spring occurred land-slides, comparable with the one that formed the Cascades of the Columbia.

By the close of 1881 the road had been completed to Algoma, at the northwest arm of Lake Pend d'Oreille, a distance of 225 miles. During 1882 work proceeded, but was included in the difficult portion referred to, and progress was

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slower. Still, 100 miles were added to the completed road, and it had reached Thompson's River. When the season of 1883 opened everything was in readiness to push the work forward to completion before its close. On the 27th of April the chief engineer's affidavit of completion to Jocko was filed, and by June the road had reached the summit of the Coriacan Defile, by way of Findlay Creek, with a maximum grade of 116 feet to the mile. The descent to the eastward, through the Coriacan Defile, involved some heavy work and maximum grades of 116 feet, but the approximation of the two ends of the road excited every one to the greatest exertion, and on the 22d of August, 1883, the rails were joined in the valley of the Little Blackfoot. The formal ceremony of the opening of the route took place September 8, 1883.

In order to reach Portland, Oreg., 214 miles from Wallula, use is made of the Columbia River line of the Oregon Railway and Navigation Company, which, like the main line of the Northern Pacific, is entirely in the interest of the Oregon and Transcontinental Company. This road is on the south side of the Columbia, and, except the last 40 miles, lies upon the edge of the river. During its construction some blasting of extraordinary proportions was done, and the whole work was difficult, especially that portion between The Dalles and the Cascades, a distance of about 45 miles. Between Wallula and The Dalles the work was much lighter, and below the Cascades the road leaves the river and finds level ground to Portland.

In order to utilize the navigation of the Columbia above the mouth of the Willamette, a portage railroad, of 6 miles, had early been built on the north bank around the Cascades, and another, of 13 miles, on the south bank from The Dalles to Celilo.

To make the all-rail communication between Wallula and Portland, the work of construction was begun between Wallula and Celilo in 1880, and in the fall of 1881 the grade was completed to the foot of the Cascades, at Bonneville, and in the spring of 1882 the road was operated to that point. The portion between Bonneville and Portland was opened in the following October.

The Oregon Railway and Navigation Company has under construction a branch from Umatilla, 187 miles above Portland, to connect, via the valley of the Grande Ronde and the Powder River Valley, with the Oregon Short-Line branch of the Union Pacific at Snake River.

This line is now in operation to the Blue Mountains, and its completion in 1884 is expected, thus giving a direct route from the Union Pacific at Granger to the Columbia River Valley. The main line continues eastward from Wallula, and by a system of branch lines, connected where practicable with steamboat navigation on the Columbia and Snake Rivers, serves the rich country south of the Snake and between the Bitter Root and Blue Mountains.

The Pacific Division of the Northern Pacific Company extends from Portland to Puget Sound, being linked to the main line as above described. It follows the Willamette from Portland to the Columbia, and thence, by the south bank of the latter, to a crossing place about two miles above Kalama and 40 miles from Portland, where trains are to be ferried over the river. It is expected that this connection will be made before the close of the present summer.

Next to the Minnesota Division the line from Kalama, on the Columbia to Tacoma, on Puget Sound, is the oldest portion of the Northern Pacific Road. The joint resolution of Congress of May 31, 1870, made the line down the Columbia and thence to Puget Sound the main line, and that proposed across the Cascades a branch, provided that 25 miles of the road between the Columbia and the Sound should be built within a year from that time, and that the whole road should be opened to the Sound before the close of 1873.

The company began to build from Kalama, on the Columbia, nine miles above the mouth of the Cowlitz, in April, 1871, and 25 miles were completed that year. During the next year 50 miles were built. Work was resumed in the spring of 1873, but was much embarrassed by financial difficulties, and only reached Puget Sound, at Tacoma, 105 miles from Kalama, twenty-four hours before the expiration of the time fixed by Congress.

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The road follows the Cowlitz for about forty miles, then across a divide to a tributary of the Chehallis, and a second divide to the Nisqually, whence it crosses level, gravelly prairies until near the Sound, and then sharply descends to tide-water. The grades are easy for the whole distance except the last two miles, where maximum grades of 116 feet to the mile are used. The construction involved no difficult work.

ROUTE NEAR THE FORTY-FIRST AND FORTY-SECOND PARALLELS.

About one-half of this work, extending from the Missouri River to Fort Bridger, was not explored with special reference to the practicability of constructing a railroad. Information furnished by the reports of Colonel Fremont and Captain Stansbury, of the Corps of Topographical Engineers, United States Army, sufficed for the due consideration of this portion.

From Fort Bridger to Fort Reading, on the Sacramento River, the explorations were conducted by Lieut. E. G. Beckwith, Third Artillery.

A route presenting favorable conditions might commence either at Fort Leavenworth, with connection with Saint Louis, or at Council Bluffs, connecting with Rock Island, ascend the Platte River, and enter the eastern chain of the Rocky Mountains (the Black Hills) by the North Fork and its tributary the Sweet Water.

Another route, by the South Fork and its tributary, Lodge Pole Creek, was suggested by Captain Stansbury as shorter and less expensive.

From the Missouri River to the entrance to the Black Hills, 30 miles above Fort Laramie, 520 miles from Council Bluffs and 755 miles from Fort Leavenworth, the route presented no difficulties whatever. West of this it crossed many lateral streams, with deep ravines, and left the Platte just below Hot Springs Gap. To avoid these, it crossed a range of hills 800 feet above the river, and descended to the Sweet Water, followed that stream to its source, where it attained the summit of the South Pass plateau at an elevation of 7,400 feet.

From the South Pass the route followed down Sandy Creek, a tributary of Green River, to the crossing of the latter, and thence to Fort Bridger. It then descended the divide between the waters of Green River and those of Great Salt Lake by the valley of Black's Fork or one of its tributaries. The summit was found on a broad terrace at the foot of the Uintah Mountains, the elevation being 8,373 feet. From this point the line descended over the undulating country separating the Uintah and Bear River Mountains crossed the head of Bear River, and entering the valley of White Clay Creek at its head, followed down that stream to its junction with Weber River.

The Wasatch Mountains intervene between this plateau country and Great Salt Lake, and it was found that the passage through them could be effected either by following Weber River, or by ascending to near the sources of the Timpanogas and descending that stream, both being directly or indirectly affluents of and equidistant from a common point on Great Salt Lake.

The valley of Great Salt Lake once entered, no obstacle was found to the construction of a railway passing by the south end of the lake to its west side.

From the western shore of Great Salt Lake to the valley of Humboldt River the country consists alternately of mountains in more or less isolated ridges, and of open, level plains, rising gradually from the level of the lake on the east to the base of the Humboldt Mountains on the west—that is, from 4,200 feet to 6,000 feet above the sea. West of the Humboldt Mountains the country is of the same character, the plains declining until at the west shore of Mud Lake, usually called the foot of the Sierra Nevada, the elevation is 4,100 feet.

The mountains in this space of 500 miles (600 miles by the route traveled) between Great Salt Lake and the foot of the Sierra Nevada have a general north and south course. Occasionally cross-spurs close in the valleys to the north and south, but more frequently this isolation is only apparent. The mountains are sharp, rocky, and inaccessible in many parts, but are low and easily passed in others. Their general elevation varies from 1,500 to 3,000 feet above the valleys.

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The valleys rarely have a width east and west of more than five to ten miles, but often are of great extent north and south. They are irregular in form, frequently extending around the ends of mountains, or united to succeeding valleys by level passages. It was found that a railroad might be carried over this series of valleys and around the mountain masses at nearly the general level of the valleys.

In this manner the route reached the foot of the Humboldt Mountains, and then crossed them by a pass nine miles long, about three of which are occupied by a narrow rocky ravine. The descent was then made to the open valley of Humboldt River, which was followed for about 190 miles, then crossed two ranges of the general character of the Basin Mountains, and reached the foot of the Madelin Pass of the Sierra Nevada, on the west shore of Mud Lake, in a distance of 119 miles and at an elevation of 4,079 feet above the sea.

In this latitude the Sierra Nevada was the eastern boundary of the Sierra Nevada plateau. Thus far the pass was of a favorable character, the length of the ascent being 22.89 miles, the difference of elevation 1,172 feet, and the altitude of the summit 5,667 feet. Having gained the plateau, it was crossed by a nearly level line to the western boundary, the summit elevation of which was 5,736 feet, and the descent to the Sacramento was made in 15 miles, with a difference of elevation of 1,300 feet. Either a tunnel or an enormous cut with heavy grade would be required at the summit.

The route then followed the valley of the Sacramento, encountering many obstacles, to a point 17 miles above Fort Reading, where the open valley was attained, and no further difficulty existed to the construction of a railroad to the Bay of San Francisco.

By the route indicated, the distance from Fort Leavenworth to Fort Bridger was 1,072 miles; from Fort Bridger to Fort Reading, 1,012 miles; from Fort Reading to Benicia, 180 miles; and from Leavenworth to Benicia, 2,264 miles.

The distance from Council Bluffs to Benicia was 2,134 miles.

By a different location 103 miles could be saved in the Great Basin, and the total distance reduced to 2,031 miles.

The coal-beds of Green River were noticed.

The winter climate along the greater portion of the route was known to be severe, but Lieutenant Beckwith did not apprehend any unusual difficulty from this cause.

The features of this route, favorable to the economical construction of a railroad, are apparent from the description given in the detailed reports.

The unfavorable features were described, as the costly construction, for nearly 300 miles along the Platte and Sweet Water, in ascending to the summit of the South Pass; in the Cañon of the Timpanogas; in the two cañons of the Sacramento, 14 and 9 miles in length, and in the sinuous course of this river for a space of 96 miles through heavily timbered mountains rising precipitously from the stream.

The sum of the ascents and descents was the next least after that of the forty-seventh to the forty-ninth parallel.

The cost of 2,031 miles of road, from Council Bluffs to Benicia, was estimated at $116,095,000.

The survey of the western portion of this route by Lieutenant Beckwith resulted in the discovery of a more direct and easier route than was believed to exist from the Great Salt Lake to the valley of the Sacramento. Subsequently, Brevet Lieutenant-Colonel Steptoe, commanding the troops in Utah, reported the discovery of a still more direct route from Great Salt Lake to San Francisco, passing to the south of Humboldt or Mary's River, and thence to the valley of Carson River.

It crossed the Sierra Nevada by the passes at the head of Carson River and descended to the valley of the Sacramento. He stated that this route was, throughout, practicable for wagons.

THIS ROUTE AS ACTUALLY OCCUPIED.

Practically this route begins at Omaha, Nebr., opposite Council Bluffs, on the Missouri River. The former town was not in existence when the explora-

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tions were made; consequently it is only the latter which is mentioned in instructions and reports. It follows the explored line to the mouth of the Lodge Pole, when it ascends that stream, as suggested by Captain Stansbury, and keeping very close to the line as laid down on the map of the explorations, reaches the valley of Salt Lake. Instead of passing around the south end of this lake, however, it passes around it by the north, and being then some 85 miles apart, the constructed gradually approaches the explored line for 250 miles, when they unite near Halleck Station. They now coincide for 200 miles and then diverge again, the explored line reaching Sacramento by way of the Madelin Pass and Pitt River, whilst the constructed line attains the same point by a much more direct line through Donner Pass, saving 184 miles of distance. From Sacramento to the Bay of San Francisco the lines are coincident.

All things considered, the close agreement of the two lines is worthy of remark, especially in view of the fact that the eastern half of the route was not explored with special reference to the construction of a railroad.

THE UNION AND CENTRAL PACIFIC RAILROADS.

These roads were built by two distinct organizations, now known as the Union Pacific Railway to Ogden, Utah, and the Central Pacific Railroad thence to San Francisco. The latter, having been first put under construction, will be first spoken of.

CENTRAL PACIFIC RAILROAD.

With information gained largely through Government explorations and surveys, Mr. T. D. Judah, an educated and accomplished engineer, early devoted himself to the advancement of the railway interests of California. In April, 1854, he began a survey for the location of the Sacramento Valley Railroad, and submitted his reports and estimates on the 30th of May following. The section of the road between Sacramento and Folsom, 22 miles, was completed in two years. It was the first railroad on the Pacific coast, and now forms part of the Central Pacific Railroad system, although not on the transcontinental line. After the results of the Pacific Railway explorations became known he published, on the 1st of January, 1857, a pamphlet of much value entitled "A practical plan for building the Pacific Railroad," which included a plan for sleeping and restaurant cars. This was two and a half years before the discovery of the Washoe silver mines, which event greatly increased the necessity for a railroad eastward from the Pacific coast. He took a prominent part in the Pacific Railroad Convention which assembled at San Francisco in September, 1859, and was accredited by that body to represent at Washington the ideas of the people of the Pacific coast upon the railway project. His report concerning his mission was published in 1860. Late in that year he explored the mountain passes through the Sierra Nevada with a view to finding, if possible, a better and more direct line than that surveyed by Lieutenant Beckwith by way of Madelin Pass, and the result was the discovery of the present route, which saves a distance of 184 miles and the corresponding cost.

Steps were now taken to organize a company under the general railroad law of the State of California, but the organization was not completed until June, 1861, when it took the name of the Central Pacific Railroad Company, with Mr. Judah as chief engineer. In 1859 he had been associated with others in running a line from Sacramento to Roseville for the American River Railroad Company. This survey was afterwards used for a part of the Central Pacific line.

By a resolution of the board of directors of 9th of October, 1861, Mr. Judah was sent to Washington as the agent of the Central Pacific Railroad Company to procure aid from the Government to construct the road. He was accompanied on the way by the Hon. A. A. Sargent, a Member of Congress from California, a young, ambitious, and indefatigable man, who upon his arrival at the seat of Government was assigned by the Speaker of the House to the Special Pacific Railroad Committee, when he devoted his time and energy almost exclusively to the

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subject. He introduced the bill granting aid in lands and bonds, taking the ground that the road was a military necessity, illustrating his argument by the existing circumstances of the country, then involved in war. The danger of delay, the necessities of the postal service, the control of the Asiatic commerce were all duly and forcibly set forth. The measure passed through all the requisite stages, the debate in the House extending from April 8, 1862, until it was closed by the passage of the bill on the 6th of May following. After several unsuccessful efforts to call it up, the bill came before the Senate on the 11th of June, and, after amendment, was passed on the 20th by the decisive vote of 35 to 5. The amendments of the Senate were concurred in by the House, and on the 1st of July, 1862, the act was signed by President Lincoln and became the law of the land.

The act related primarily to the Union Pacific Railroad, and was entitled "An act to aid in the construction of a railroad and telegraph line from the Missouri River to the Pacific Ocean, and to secure to the Government the use of the same for postal, military, and other purposes." It included, however, the Leavenworth, Pawnee and Western Railroad of Kansas, the Central Pacific Railroad of California, the Hannibal and Saint Joseph Railroad, and the Pacific Railroad Company of Missouri; thus recognizing existing companies at either end of the route.

The act granted bond subsidies of these clauses, $16,000 per mile over the plains sections, $48,000 per mile over the mountain sections, and $32,000 per mile over the intermediate portion, between the western base of the Rocky Mountains and the eastern base of the Sierra Nevadas. These bonds were a first lien upon the roads and their fixtures, and eventually repayable. The grant of lands was for five alternate sections on each side of the railroad (these being designated by the odd numbers) within the limit of ten miles on each side of the road. By the act approved July 2, 1864, these numbers were doubled, and the companies were authorized to issue mortgage bonds to an amount equal to those issued by the Government, and they were given priority. Additional acts modifying the original law have been passed from time to time, but it is not deemed necessary to specify these changes here.

The act required each company named therein to file their acceptance of its conditions within six months after its passage. It required the Central Pacific Company to complete 50 miles of its road within two years after filing such acceptance, and 50 miles per year thereafter, and authorized it to build eastward until it met the railroad coming from that direction.

By a communication dated November 1, 1862, the Central Pacific Railroad Company of California accepted the conditions, the receipt of this acceptance being acknowledged by the Secretary of the Interior under date of December 24, 1862.

The final working surveys of the first division of 50 miles were completed during the autumn of 1862, and the work of grading was begun with a good deal of ceremony in January, 1863, Governor Leland Stanford, president of the company, turning the first spadeful of earth.

On the 12th of January, 1864, President Lincoln officially established "the point where the line of the Central Pacific Railroad crosses Arcade Creek, in the Sacramento Valley, * * * as the western base of the Sierra Nevada Mountains." The object of this was to determine the beginning of the Sierra Mountain section, to govern the issue of the Government bonds.

By June, 1864, 31 miles of track had been laid, but because of adverse circumstances it was not until September, 1866, that the road was completed to Alta, 70 miles east of Sacramento, and 5,625 feet above the level of the sea. In November the track reached Cisco, 22 miles farther, at an elevation of 5,911 feet, the last 2,286 feet having been overcome in a distance of 23 miles. It was still 13 miles to the summit of the Sierra, and to pass it a tunnel was necessary. However, the hardest part of the work on this section was already done. The deep snow of the winter now put a stop to further operations, and nothing was done upon the work

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of grading until the following spring. It was then resumed, with thousands of laborers to push it along. By mid-summer of 1867 the road was completed to the summit, and the force was at work on the tunnel there, and down the eastern slope. On the 30th of November, 1867, the first passenger train reached the summit, and in December the road had crossed it at an elevation of 7,042 feet, and had reached the Lower Truckee, nearly 140 miles east of Sacramento.

In going 105 miles east of Sacramento the road overcame an elevation of 6,986 feet, or an average of 69½ feet to the mile, while much of the mountain grade was from 90 to 100 feet. Between Colfax and Cisco, a distance of 38 miles, it was necessary to rise 3,463 feet, or an average grade of 91 feet, while for short distances it was from 105 to 116 feet, the latter being the legal maximum.

The work was again delayed by the storms of winter. Both the Central and Union Companies were now about equidistant from the head of Salt Lake, and as the season of 1868 opened the race between the two for that point, which had really been going on for a twelvemonth, was pushed with the utmost vigor, with a resulting speed in railroad building such as was before unknown. Literally an army of workmen were employed (25,000 men and 6,000 teams), and the 1,100 miles of route between the Sierra and Rocky Mountains presented a busy scene. The woods rang with the strokes of the ax and the quarries with the click of steel. The streams were bordered with lumbermen's camps and choked with floating logs, and materials, supplies, and equipment for the Central Pacific were scattered from New York, via Cape Horn and San Francisco, to the very end of the track advancing eastward. Track was laid at the rate of two to six miles a day by each company, and on one day even seven miles by the Central Pacific. It is a fact that on some days a greater distance was laid than the ox teams of 1849 averaged for a day's journey.

By September 30, 1868, the Central Pacific track extended 350 miles eastward, and the graders were 50 miles ahead, and another grading party, starting at the head of Salt Lake, were coming westward 100 miles.

As the two roads approached each other the competition between them increased, and the whole country watched the race with the greatest interest. Surely no other of equal importance or grander in its results was ever run on the face of the earth.

The winter of 1868–'69 operated to delay work on the Union Pacific, but the Central Pacific, being now in the Great Basin, was interrupted but one week. It had no difficulty with snow, except in the Sierras, where but 22 miles of the 40 or 50 of snow belt had been protected by snow-sheds. It was found necessary before another winter set in to protect the whole of this distance.

During the progress of the construction some controversy arose between the two companies in interest in regard to the point where they should join. It was finally agreed that the junction should be made at a point five miles west of the town of Ogden, Utah, the Central Company leasing from the Union this length of track, so that the junction should practically be at that town.

The tracks of the two roads were finally made continuous by the driving of the last spike; an engineer from the west met one from the east, and on the 10th of May, 1869, the entire route was thrown open to traffic, more than seven years ahead of the time fixed in the law.

The following statement will show the number of miles of road constructed annually by the Central Pacific Railroad Company on this line:

To 1866	56
In 1866	38
In 1867	44
In 1868	362
In 1869	243
Total	743

These distances do not correspond with those given by the Commissioner of Railroads, because the latter states them for fiscal years, while the foregoing table

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is for calendar years, and for the additional reason that the statement of the Commissioner is made up from the dates of the affidavits of the chief engineer, and these are necessarily subsequent to the completion of the sections to which they refer.

THE UNION PACIFIC RAILROAD.

This road was provided for in the same law (July 1, 1862) that authorized the construction of the Central Pacific, and is the one which appears prominently in the act.

While the energy of the West was still engaged in penetrating the secrets of the Sierra, a movement meaning work began to develop in the East. In general terms there were two separate railway systems from east to west, one concentrating at Chicago, the other at St. Louis. The capitalists of both these cities were alive to the vast possibilities of the Pacific trade, and desired to secure it for their respective localities. With this view Chicago had projected three lines across the State of Iowa, converging at Council Bluffs, and they all had a corporate existence and formed a nucleus for a distinct movement for the construction of a railway to the Pacific.

On the other hand Saint Louis, aided by the State of Missouri, had, as early as 1851, begun the construction of the Missouri Pacific Railway, the terminus of which was fixed at Kansas City. Four years later the Territorial government of Kansas incorporated the Leavenworth, Pawnee and Western Railroad, with authority to build from Leavenworth to Fort Riley, and thence westerly. It was apparent that the two companies might connect and thus form a rival grand trunk Pacific road.

For some years these enterprises remained in abeyance; but in 1860–'61 the discovery of gold and silver in Colorado and Nevada gave a great impulse to the carrying trade of the plains, and the prospect of profit aroused capitalists. Rumors of the new line over the Sierra also found their way east; and the legislature of the new State of Kansas passed a joint resolution in March, 1862, urging on Congress the creation of a National Pacific Railroad Company, and the representatives of all the interests concerned appeared at Washington. The result was the law of July 1, 1862. The rival interests of Chicago and Saint Louis appear in the fact that the law does not fix any special eastern terminus, but locates the initial point on the one hundredth meridian, at some equidistant station to be designated by the President of the United States. As the more southerly line was already possessed of an organization, the charter modified this advantage by incorporating the northerly line under the name of the Union Pacific Company, and gave it a marked predominance in the act. Government aid was given in equal degree, however, to the road which was to cross the mountains from Sacramento and to both the eastern lines, but required the eastern roads to each build 100 miles within two years after their acceptance of the conditions of the law.

The commissioners of the Union Pacific Railroad and Telegraph Company, named in the act of July 1, 1862, met in Chicago on the 2d of September, 1862, and organized by electing William B. Ogden president, Thomas W. Olcott treasurer, and Henry V. Poor secretary, and by resolution instructed the officers of the company to accept the act of incorporation in behalf of the company. Under date of June 23, 1863, the Secretary of the Interior was duly notified of this acceptance, and the receipt of this notification was acknowledged by him on the 27th. The act of July 2, 1864, modified some of the provisions of the previous one. Its provisions were accepted by the company under date of October 7, 1864.

The Leavenworth, Pawnee and Western Railroad Company (southerly route), under date of November 15, 1862, accepted the provisions of the act of July 1, 1862, the notification of acceptance being acknowledged by the Secretary of the Interior on the 23d of December, 1862. As early as 30th September, 1862, the company had contracted for an immediate and rapid construction of their line.

On the 17th of June, 1863, this company notified the Interior Department that, under the laws of the State of Kansas, it had changed its corporate name to the

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"Union Pacific Railway, Eastern Division," and that it was their intention to construct the line from the one hundredth meridian to the western boundary of the State of Nevada.

On the 6th of July the Secretary of the Interior acknowledged receipt of this communication, but declined to decide at that time whether the company had the power claimed. The conditions of the act of July 2, 1864, were accepted on the 5th September, 1864, and the acceptance was acknowledged by the Interior Department on the 9th.

On the 7th of March, 1864, President Lincoln, in accordance with the requirements of the act of July 1, 1862, fixed a point on the western boundary of the State of Iowa, "east of and opposite to the east line of section 10, in township 15 north, of range 13 east, of the sixth principal meridian, in the Territory of Nebraska," from whence the Union Pacific Railroad Company was authorized to construct a line to connect with some point on the one hundredth meridian. The terminal point as thus fixed was at Omaha.

During the season of 1864 five engineering parties were engaged for several months in preliminary surveys of the several passes through the mountain ranges between the valley of the South Platte and Salt Lake, and the contract for the construction of the road to the one hundredth meridian was signed in August.

On the 3d November, 1864, the company submitted a map of the route of the Union Pacific for the first 100 miles west of Omaha, and the location was approved by the President of the United States on the following day.

By the 29th of November the grading was in progress on 40 miles of the line. The inaugural ceremony took place on the 2d of December.

Meanwhile the organization for building the southerly line obtained from Congress the privilege of making their own road the grand trunk route connecting with the Central Pacific, in case they should anticipate the Union Pacific in reaching the one hundredth meridian. The same act also granted an extension of a year for the time of completion of the first 100 mile division of each road.

Whilst all this was going on the location of the road from Omaha westward for 23 miles was found to be unsatisfactory, and the company, on May 12, 1865, requested authority to change it, increasing the distance about eight miles but reducing the grades from 80 feet to 30. This gave rise to much correspondence and investigation, with considerable delay, but on the 23d September, 1865, President Johnson authorized the abandonment of the former line and the adoption of a new one.

By the 19th of October, 1865, 16 miles of tract had been laid from the Missouri River, and arrangements had been made for going on with the work at the rate of one-half mile per day.

The southerly line had completed 40 miles of its road by the 25th of April, 1865. During the summer of 1863 a contest for the possession of the road and its franchises had arisen, the result of which was to annul the contract of September, 1862, and to transfer the ownership of the road. The litigation growing out of this movement had greatly delayed operations.

Whilst the controversy concerning the location of the first section of the Union Pacific was going on but little progress was made, and after the settlement of that question it was too late to do much in the field. Consequently the contractors addressed themselves with great energy to the task of accumulating laborers and materials for a vigorous prosecution of the work on the opening of the next season. The eastern connections with Omaha by rail had not yet been made, and the difficulty and expense of this were simply enormous. When the spring of 1866 opened, all was in readiness and only awaited the signal to assume the most tremendous activity.

About the middle of April the word was given and the Platte Valley at once became a busy region. Mile by mile and day by day the work progressed. By the middle of May, 80 miles of road had been completed; by August 19, the road had reached a point on the Platte opposite Fort Kearney, 194 miles west of Omaha; and when the year closed 305 miles of the road were completed, 265 miles having been built in the twelve months, 65 miles of it in one month, and three miles in one day.

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In December, 1866, connection was made between Omaha and Chicago by the completion of the Northwestern Railroad, thus greatly lessening the difficulty of bringing forward materials and supplies.

Upon the opening of the season of 1867 the previous season's activity was renewed, and in October the road reached well into the Black Hills. When the end of the year came the end of the road was 550 miles west of Omaha, and the season's work had netted 245 miles of completed road. In 1868 the length of the road operated increased 350 miles, and with the completion of 134 miles in 1869, junction was made with the Central Pacific, as before stated, on the 10th of May of that year.

Meanwhile, the construction of the southern line was continued, but its chance of becoming the main line of the trunk route was lost by its failure to reach the one hundredth meridian in advance of the Union Pacific, and it was therefore headed towards Denver, which was rapidly growing into importance. It had a continued fight with the Indians occupying the Smoky Hill River country, who exhibited the strongest opposition to the building of a railroad along that stream.

By act of Congress of May 31, 1868, the name of the company was again changed, and it became "The Kansas Pacific." The road was completed to Denver, 639 miles from Kansas City, on the 1st of September, 1870.

The Denver Pacific Railroad, connecting the Kansas Pacific with the Union Pacific at Cheyenne, a distance of 106 miles, was constructed by the Kansas Pacific Company under a charter dated November 19, 1867, and was opened January 1, 1871, and on the 24th of January it, together with its parent company, was consolidated with the Union Pacific Railroad Company, the resulting organization being thereafter known as the Union Pacific Railway Company.

ROUTE NEAR THE THIRTY-EIGHT AND THIRTY-NINTH PARALLELS.

The general consideration which determined the position of this route was its central position geographically, it being about midway between Canada on the north and Mexico on the south, and connecting Saint Louis and San Francisco, which are respectively on latitude 39° and 38° nearly. Moreover, it seems probable that it would prove the shortest road from the bay of San Francisco to the navigable waters of the Mississippi.

The exploration was conducted by Capt. J. W. Gunnison, Corps of Topographical Engineers, United States Army. It commenced at the mouth of the Kansas River (present Kansas City) and followed that river and its branch, called the Smoky Hill Fork, to a convenient point for crossing to the Arkansas, the valley of which it entered just west of the Great Bend, near the ninety-ninth meridian. It ascended the Arkansas to the mouth of Apishpa Creek, 50 miles above Bent's Fort, then crossed to the entrance of the Rocky Mountains (here called the Sierra Blanka) at the Huerfano Butte, 654 miles from the starting point, and at an elevation of 6,099 feet.

Of the several passes through the Rocky Mountains, connecting the tributaries of the Huerfano with those of the Rio del Norte, only the Sangre de Cristo was reported practicable for a railroad. By side location the summit, 9,219 feet above the sea, was attained at 692 miles from the mouth of the Kansas, and the descent was made to the valley of the Rio Grande with practicable, though heavy grades. The line thence to the vicinity of Fort Massachusetts was more favorable.

The route then, with easy grades, ascended the valley of the San Luis to Sahwatch (or Saguache) Creek, one of whose affluents rises in a pass of the Rocky (here called the Sahwatch) Mountains known as the Cochetopa Pass, the elevation of which was 10,032 feet—816 miles from the starting point.

To cross the summit, a grade of 124 feet to the mile for several miles, and a tunnel nearly two miles long, would be required.

The descent from Cochetopa Pass, with grades varying from 41 feet to 108 feet to the mile, was by way of Pass Creek to its junction with Cochetopa Creek, and thence to the valley of Grand River, which it followed for 173 miles, and then crossed the divide to Green River, a distance of 68 miles, and approached the pass through the Wahsatch Mountains by the tributaries of Green River. Here a tunnel three-quarters of a mile long would be required, with eastern grades of approach

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of 125 feet to the mile for 6½ miles, and a descent to the westward of 131 feet to the mile for five miles. Thence westward for 18 miles the route, with heavy grades, pursued the valley of Salt Creek, and then entered the valley of the Sevier, and 86 miles farther on the exploration terminated, at a distance of 1,348 miles from its beginning.

From the mouth of the Kansas to the Sangre de Cristo Pass the route presented no peculiar difficulties nor advantages, but was quite similar to the two more northerly ones.

The Sangre de Cristo and Cochetopa Passes were deemed practicable, but at great cost.

Upon the whole the route was considered impracticable because of the engineering difficulties and the cost of construction involved in overcoming them. (It may not be amiss to remark here that a railroad has been built and the cars are now running over this very route.)

Aside from the difficult nature of this route the following considerations were urged in regard to the cost of operating a railroad in case one were constructed. From the mouth of the Kansas River to the west base of the Un-kuk-oo-ap Mountains is 1,523 miles; the sum of ascents, 23,190 feet; of descents, 19,052 feet; length of equivalent horizontal line for the route, 2,123 miles.

Of the direct route from the western base of the Un-kuk-oo-ap Mountains to the entrance to the Tay-ee-chay-pah (Tehachapi) Pass there was no survey nor positive information. It was believed to be, for the most part, a desert similar to other portions of the Great Basin. Supposing this part of the route to be a straight line, with uniform descent to the entrance of the Tay-ee-chay-pah Pass (no practicable pass was known to the north of it), the distance would be 430 miles and the descent 1,830 feet; the equated horizontal distance, 464 miles.

From the entrance of the Tay-ee-chay-pah Pass to San Francisco was 326 miles; sum of ascents, 1,308 feet; sum of descents, 4,608 feet; equated length, 440 miles.

Adding all these together, the sum, 3,027 miles, represented the equated distance from the mouth of the Kansas to San Francisco, the length of a straight, horizontal line between the terminal points being only 1,500 miles.

The distance from Sevier River to Great Salt Lake was 120 miles; sum of ascents and descents, 1,600 feet; equated distance, 150 miles; thence to Benicia, by the route near the forty-first parallel, explored by Lieutenant Beckwith, 872 miles; sum of ascents and descents, 15,200 feet; making the equivalent horizontal line 1,160 miles; which, added to the equated distance from the mouth of the Kansas to Sevier River, 2,050 miles, gave a total of 3,360 miles as the equated distance between the terminal points.

When Captain Gunnison reached Sevier River he was killed by Indians, and the charge of the exploration devolved upon Lieut. E. G. Beckwith, who made an examination from the Great Salt Lake, to connect that position with the line of the forty-first parallel; then returned to Salt Lake and continued the survey westward to the waters of the Pacific, as related in the account of the route near the forty-first and forty-second parallels.

ROUTE NEAR THE THIRTY-EIGHTH AND THIRTY-NINTH PARALLELS AS ACTUALLY OCCUPIED.

Practically, all of the explored portion of this route has been occupied from Kansas City to Pueblo, 635 miles, by the Atchison, Topeka and Santa Fé Railroad, and from Pueblo to Great Salt Lake, at Salt Lake City, by the Denver and Rio Grande Railway, although certain portions have been more exactly occupied by other lines. For instance, the Kansas Pacific is coincident with the explored line from Kansas City to Ellsworth, a distance of 223 miles, but nowhere very distant from the Atchison, Topeka and Santa Fé Railroad. At Ellsworth the explored line leaves the valley of the Smoky Hill, and in a distance of about 40 miles crosses to the valley of the Arkansas at the Great Bend, a little east of the 99th meridian, when the Atchison, Topeka and Santa Fé road becomes coincident

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with and follows it for 310 miles to the mouth of Apishpa Creek, a short distance west of Bent's Fort. At Apishpa Creek the routes diverge again, the constructed line reaching the valley of Cochetopa Creek by a direct route through Pueblo, the Cañon of the Arkansas, and Tomachi Creek, whilst the explored line attained the same point via the Sangre de Cristo Pass. (The Denver and Rio Grande has built through this pass in order to reach the valley of the Rio Grande, but not in connection with the through line.) The constructed and explored lines now coincide again for about 350 miles, but instead of passing to the southward of Great Salt Lake, the line, as built, passes to the eastward of it, and at Salt Lake City makes connection for Ogden, on the Union Pacific, and becomes lost in the forty-first and forty-second parallel route.

A comparison of this statement with the brief of the description of the explored route will show how closely the constructed line has followed it until Salt Lake Valley is reached. It is not probable that the line westward from that point will ever be built.

ATCHISON, TOPEKA AND SANTA FÉ RAILROAD.

The Atchison, Topeka and Santa Fé Railroad Company was originally incorporated, under the name of the Atchison and Topeka Railroad Company, by an act of the legislative assembly of the Territory of Kansas, approved February 11, 1859, and the name was subsequently changed in accordance with the Territorial laws, by a vote of the stockholders, November 24, 1863, to the Atchison, Topeka and Santa Fé Railroad Company.

By the second section of the Territorial act the company was—

> Authorized and empowered to survey, locate, construct, complete, alter, maintain, and operate a railroad, with one or more tracks, from or near Atchison, on the Missouri River, in Kansas Territory, to the town of Topeka in said Territory, and to such point on the southern or western boundary of said Territory, in the direction of Santa Fé, New Mexico, as may be most convenient, suitable for the construction of said road, and also to construct a branch of said railroad to any point on the southern boundary of said Territory of Kansas, in the direction of the Gulf of Mexico.

By an act of Congress, approved March 3, 1863, certain lands were granted to the State of Kansas for the purpose of aiding in the construction of railroads in that State. The following is so much of that act as relates specially to this road, viz:

> Second, of a railroad from the city of Atchison via Topeka, the capital of said State, to the western line of the State, in the direction of Fort Union and Santa Fé, New Mexico, with a branch from where this last-named road crosses the Neosho Valley to the point where the said first-named road enters the Neosho Valley; every alternate section of land designated by odd numbers, for ten sections in width on each side of said road and each of its branches.

This grant was conditioned upon the completion of the road within ten years of the date of the act.

By an act of the legislature of Kansas, approved February 9, 1864, the State of Kansas accepted the grants made by Congress, and granted to the Atchison, Topeka and Santa Fé Railroad Company such of the lands granted by Congress to the State as were applicable to that road.

By September, 1869, the road was in operation from Topeka to Burlingame, 26 miles. By July, 1870, it had been extended 35 miles to Emporia, and in July, 1871, it began operating to Newton, 74 miles farther, when building was stopped for a time. On the 9th September, 1872, it was opened to Dodge City, 168 miles beyond Newton and 303 from Topeka. During the month of April, 1872, the road had been opened from Atchison to Topeka, a distance of 50 miles, so that there was now a continuous line for 353 miles from that point on the Missouri River to Dodge City on the Arkansas. On the 1st of January, 1873, the road was opened to the boundary line between Kansas and Colorado, about 470 miles from Atchison. Under the spur of the near approach of the time when the land grant would expire, the company had built 285 miles of road in nine months, or over a mile a day.

On July 10, 1873, the road began operating to Grenada, 481 miles from Atchison, and 18 miles from the State line at Coolidge.

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This company makes its through line from Kansas City by means of the Kansas City, Topeka and Weston Railroad, which is now owned by it, and runs from Kansas City to Topeka, and by the Pueblo and Arkansas Valley Railroad westward from the State line to Pueblo, and southwesterly to the boundary of New Mexico. This southwesterly extension has no connection with this route, and is therefore not considered here. (See thirty-fifth and thirty-second parallel routes.)

The road was opened from Kansas City to Topeka, 66½ miles, on the 29th of August, 1875, and the western extension was opened from Grenada to West Las Animas, 55 miles, on September 17, 1875, and to Pueblo, 83 miles farther, on the 4th of March, 1876.

At Pueblo the route under consideration is taken up by the Denver and Salt Lake line of the Denver and Rio Grande Railway. The gauge of this route is only 3 feet, while that of the Atchison, Topeka and Santa Fé is the standard gauge of 4 feet 8½ inches. The result is a break at Pueblo, and a consequent transfer of freight and passengers is rendered necessary.

The Denver and Rio Grande Railway Company was incorporated October 27, 1870, under the incorporation laws of the Territory of Colorado. By act of Congress approved June 8, 1872, right of way was granted "over the public domain, 100 feet in width on each side of the track, together with such public lands adjacent thereto as may be needed for depots, shops, and other buildings for railroad purposes, and for yard room and side tracks, not exceeding twenty acres at any station, and not more than one station in every 10 miles," and the incorporation under Territorial laws was ratified and confirmed. The company was required to complete its line to a point on the Rio Grande as far south as Santa Fé, within five years after the passage of the act, and to complete 50 miles additional south of that point each year thereafter, the penalty for non-compliance being a forfeiture of all rights and privileges granted by the act, so far as concerned the unfinished portion of the road.

Omitting all reference to such parts of the line as do not form a part of the thirty-eighth and thirty-ninth parallel route, the following is an approximate statement of the progress of the construction.

The road was extended from Pueblo, up the Arkansas Valley, to Cañon coal-fields, 36 miles, in 1872, and in 1874 to Cañon City, eight miles. It was subsequently opened to Salida and Poncha, 60 miles, and in 1881 to Gunnison City, 69 miles farther, or 170 miles from Pueblo. During 1882 the construction westward to the Utah boundary, 171 miles, was completed, and the force building eastward from Salt Lake City had reached a point 150 miles from that place. The ends of the track were joined in 1883, and connection made with the Union Pacific at Ogden.

ROUTE NEAR THE THIRTY-FIFTH PARALLEL.

The general features which determined the position of this route were the extension west and east of the interlocking tributaries of the Mississippi, the Rio Grande, and the Colorado of the West. Its exploration was conducted by Lieut. A. W. Whipple, of the Corps of Topographical Engineers, United States Army.

Commencing at Fort Smith, about 270 miles from the Mississippi at Memphis, the route, as far as the Antelope Hills on the Canadian, a distance of 400 miles, was found practicable, either by the valleys of the Arkansas and Canadian or over a line south of the Canadian—this latter route branching again, and following either the valley of the Washita or the dividing ridge between it and the Canadian.

From the Antelope Hills the route continued for 250 miles along the right bank of the Canadian to the mouth of Tucumcari Creek; ascended by the valley of this stream, or by that of Pajarito Creek, attaining the dividing ridge between the Canadian and the Pecos Rivers at an elevation of about 5,543 feet, and entered the valley of the latter. It followed this valley until, by means of a tributary, it rose to the high land lying east of the Rocky Mountains at an elevation of about 7,000 feet; crossed the elevated Salinas basin, 30 miles wide, the

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lowest point being 6,741 feet, and gained the divide in the Rocky Mountains at an elevation of about 7,000 feet; from there it either descended through the San Pedro Pass to Albuquerque or Isleta on the Rio Grande, or to the Rio Grande by the valley of the Galisteo River, north of Sandia Mountain. A third route was indicated along the valley of the Pecos to its headwaters; thence to an affluent of the Galisteo, and thence, as before, to the Rio Grande.

The elevation of Isleta was stated to be 4,945 feet above the sea, and its distance from Fort Smith 854 miles.

Crossing the ridge separating the Rio Grande from the Puerco, the route followed the valley of the San José to one of its sources in a pass of the Sierra Madre known as the Camino de Obispo; passing the summit at an elevation of 8,250 feet, where a tunnel three-quarters of a mile long at an elevation of 8,000 feet would be required; then descending to the Zuñi River near the Pueblo of Zuñi; and then, over underlating ground to Navajo Spring, on the Puerco of the West.

Another route was examined across the Sierra Madre, about 20 miles north, which was thought to be more favorable. The elevation of the summit was about 7,750 feet. The Puerco of the West heads in this pass, and the route followed the valley of this stream to Navajo Spring, where it joined the other line, and thence down the valley to the junction of the Puerco with the Colorado Chiquito; then down the valley of the latter to the foot of the southeastern slopes of the San Francisco Mountains, elevation 4,775 feet; distance from Fort Smith, 1,182 miles. Here it ascended to the dividing ridge between the waters of the Gila and the Colorado of the West, and continued upon or near it for about 200 miles, to Aztec Pass, elevation 6,281 feet; distance from Fort Smith, 1,350 miles. The highest point reached on this undulating ridge was 7,742 feet, at Leroux's Spring, at the foot of the San Francisco Mountain. From Aztec Pass the descent to the Colorado was made by a circuitous route along the valleys of its tributaries, the largest and last being Bill Williams Fork, the junction of which with the Colorado was stated to be 1,552 miles from Fort Smith and at an elevation of about 208 feet above the sea.

The route then ascended the Colorado, about 34 miles, to the Needles, where it left the river by the valley of a stream (dry at the time) whose source was in an elevated ridge. The summit was attained at an elevation of 5,262 feet, and the route then descended, with an average grade of 100 feet to the mile, for 41 miles to Soda Lake, at an elevation of 1,117 feet. From Soda Lake the ascent to the summit of Cajon Pass, in the Sierra Nevada, elevation 4,179 feet, was made by following the Mojave River. The summit of this pass, following the line, was found to be 1,798 miles from Fort Smith and 242 miles from the point of crossing the Colorado. Here a tunnel, about three miles long, was reported as necessary, descending to the westward with a grade of 100 feet to the mile, which would be the average for 22 miles, to the valley of Los Angeles, the natural grades varying from 90 feet to 171 feet per mile. Thence to the port of San Pedro, 1,892 miles from Fort Smith, the ground was favorable.

Between Fort Smith and San Pedro the sum of the ascents was 24,171 and of descents 24,641 feet, which was estimated as equivalent to an increased horizontal distance of 924.5 miles, or a total equated distance of 2,816 miles.

The general features of the country indicated lines for examination at more than one point which would probably greatly improve the route by reducing the ascents and shortening distances. The exploring party was, however, unable to examine them. The impression given by the description of the route in the report produced in the Secretary of War an opinion that the ground was more favorable than Lieutenant Whipple reported. (Subsequent events have justified this opinion of the Secretary. The well-known characteristics of Lieutenant Whipple caused him to avoid any overstatement of the advantages of the route which he had himself examined. He always kept *within* the *facts*.)

The estimated cost of a railroad from Fort Smith to San Pedro by this route was $169,210,265, and the Secretary believed this estimate to be excessive.

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To reach San Francisco by the Tulares and San Joaquin Valleys, the route left the Mojave Valley some 30 miles before reaching the entrance to the Cajon Pass, 1,768 miles from Fort Smith, elevation about 2,555 feet, and proceeded across the southwest corner of the Great Basin towards the Tay-ee-chay-pah Pass, reaching its entrance at an elevation of 3,300 feet in a distance of about 80 miles. From this point the route was coincident with that hereafter described for the thirty second parallel.

The sum of the ascents from Fort Smith to San Francisco by this route was stated as 25,100 feet, of descents, 25,570—estimated as equivalent to a horizontal distance of 963 miles, or a total equated distance of 3,137 miles.

ROUTE NEAR THE THIRTY-FIFTH PARALLEL AS ACTUALLY OCCUPIED.

This route has only been completed from Isleta, in New Mexico, to Mojave station of the Southern Pacific Railroad, just south of Tehachapa (Tay-ee-chay-pah) Pass in California. It has been located from Isleta to Red Fork in the Indian Territory, four miles west of the Arkansas River, whence there is a completed line via Vinita, Ind. Ter., and Springfield, Mo., to Saint Louis. From Fort Smith a branch is projected to intersect the main line 100 miles west of Tulsa.

Considering the branch from Fort Smith, the located and completed line is almost exactly coincident with the explored line. The first divergence is at the mouth of Pajarita Creek, where two lines have been surveyed, one along the explored line ascending that stream, and the other following the Canadian some 45 or 50 miles farther, and then deflecting to the southward until it intersects the explored line near Cañon Blanco, when the surveyed and explored lines coincide to Isleta and thence forward as constructed across the greater part of Arizona to the vicinity of Aztec Pass, when the line diverges to the northward, and reaches the crossing of the Colorado near the Needles by a route to the westward of that explored. From the crossing of the Colorado the line, as constructed, is nearly or quite straight to Mojave station, whilst the explored line ascended Pah-ute Creek, and crossed to the Sink of Mojave. Ascending that stream it reached Los Angeles via San Bernardino Pass, with a route diverging from it, about 35 miles north of San Bernardino Pass, which, after some indirection, attained Mojave station. It cannot but be remarked how slight these divergences are, the departures in no case exceeding 25 miles, and these for only short distances.

The route of the thirty-fifth parallel so far as constructed may, for all practical purposes, be considered as beginning at Saint Louis, and is composed of the Saint Louis and San Francisco Railway, the Atlantic and Pacific Railroad, and the Colorado Division of the Southern Pacific Railroad.

A gap of about 600 miles now exists between Isleta and the western end of the track of the Saint Louis and San Francisco road. For the time being transportation is carried on by the way of the Atchison Topeka and Santa Fé Railroad, thus forming a through route from the Mississippi River to the Pacific coast.

The Saint Louis and San Francisco Railway Company is successor to the southwest branch of the Pacific Railroad of Missouri, chartered December 25, 1852, which received a grant of lands and the loan of $4,500,000 Missouri State bonds to aid in its construction. It was opened to Rolla, 113 miles, in December, 1860. Getting into financial difficulty, it was sold in 1866 to a new company which failed to meet its engagements, and was again sold to purchasers who were incorporated as the South Pacific Railroad Company under an act of the general assembly of the State of Missouri of March 7, 1868. This company completed the road to Lebanon, 71 miles, in 1869; to Springfield, 56 miles farther, in May, 1870, and added another 50 miles, to Pierce City, 290 miles from Saint Louis, in the following September. The road was then sold to the Atlantic and Pacific Railroad Company, which had been chartered by act of Congress of July 27, 1866, and empowered to construct a continuous line of railroad and telegraph from Springfield, Mo., to a point on the Canadian River, thence via Albuquerque, N. Mex., along the thirty-fifth parallel, to the Pacific, with the right to construct a branch from

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the Canadian River "to a point in the western boundary line of Arkansas at or near the town of Van Buren." (This was to make the connection with Fort Smith.)

The act gives a land grant of ten alternate sections of land on each side of the road in the States and twenty sections in the Territories, but no other subsidy.

Springfield was made the initial point to avoid conflict with a previous charter for building from Saint Louis southwesterly, given to the South Pacific Railroad Company. As, however, Saint Louis was the natural eastern terminus of a transcontinental road on this route, and as the road from Springfield west could only be constructed economically after the completion of that portion between Saint Louis and Springfield, the company, immediately after receiving its charter, turned its attention to securing the construction of this eastern division. For this purpose, and that there might be no delay, the stockholders of the Atlantic and Pacific Company purchased the stock of the South Pacific, and the two companies became thus substantially identical in ownership and management. The work was rapidly prosecuted from Saint Louis to Springfield under the name of the South Pacific, and thenceforward under the name of the Atlantic and Pacific to the State line. On the 1st of July, 1872, the South Pacific was formally and legally merged in the Atlantic and Pacific by a lease for 999 years, so that the latter company became nominally, as during the construction it was practically, the owner of the entire line from Saint Louis west. By the 14th of October, 1871, the road was fully completed, fully equipped, and in successful operation to Vinita, a town in the Indian Territory, about 35 miles west of the western border of Missouri, a total distance of 365 miles.

The foregoing shows what the company had done up to December, 1871, when the last section of its road in the Indian Territory was accepted by the President of the United States.

About this time unseen difficulties arose to prevent the continuous prosecution of the work, and Congress was appealed to by the company to extinguish the Indian title to the lands embraced within the grant, so as to allow settlement to be formed along the road to give it a business in the Indian Territory, but without effect. These circumstances and conditions hindered the progress of construction from 1871 to 1873, when the financial panic or crash occurred, during the continuance of which the building of railroads throughout the country was generally suspended.

The money for completing the South Pacific Road between Saint Louis and Springfield, and for building the Atlantic and Pacific from Springfield to Vinita, had been raised upon mortgage bonds, but owing to the circumstances above stated, default was made in the payment of interest and the mortgage was foreclosed, and all of the company's road and property in the State of Missouri was sold under the foreclosure on the 8th of September, 1876, leaving the company with a considerable debt of various kinds and only 35 miles of road in the Indian Territory, with no rolling stock to operate it.

The company remained in this bankrupt or crippled condition until January, 1880, when an agreement was entered into between it and the Saint Louis and San Francisco, and the Atchison, Topeka and Santa Fé, for the resumption of the work of construction from Vinita westward, and westward from Albuquerque on the Rio Grande River.

Under the agreement referred to, the two companies named assumed and paid all of the indebtedness of the Atlantic and Pacific road excepting a small amount, the payment of the interest upon which they also provided for and pay as the same falls due.

The Atlantic and Pacific being thus relieved, and having its credit restored by the indorsement of the two companies, commenced the work of construction westward from Albuquerque, on the Rio Grande River, in 1880.

In the autumn of 1881 the company began an exploration and survey of its line westward from Vinita with a view to the rapid construction of its road from that point to Albuquerque. Engineer parties were organized, equipped, and sent

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into the field, but were hindered from doing any work for several months, and were eventually recalled. In 1882 the work of construction was resumed on this portion of the road, and it is now completed and in operation to Red Fork, a short distance beyond the Arkansas, 68 miles west of Vinita and 432 from Saint Louis.

It is the purpose of the company to extend its road westward to the Rio Grande, a distance of some 600 miles, in the shortest practicable time. There is less necessity, however, for the immediate construction of this portion, because the Atchison, Topeka and Santa Fé Railroad now furnishes a connection between Saint Louis and Isleta, N. Mex., through its southwestern extension from La Junta, upon which grading was begun in May, 1873, and the road opened to Trinidad September 20, 1878, and to the boundary line between Colorado and New Mexico July 10, 1879. On April 14, 1880, it was opened to Albuquerque, and shortly thereafter to Isleta. By this route via Kansas City and La Junta the distance from Saint Louis to Isleta is 1,211 miles. By the link yet to be constructed between Red Rock and Isleta it will be nearly 200 miles less.

The work of construction westward from Isleta was begun in May, 1880, jointly by the Atchison, Topeka and Santa Fé, and the Saint Louis and San Francisco railroad companies; to which was afterwards joined the Southern Pacific of California, which was authorized by act of Congress, July 27, 1866, to construct the San Francisco connection. With the exception of about six months' delay at Cañon Diablo, during which the grading was carried 150 miles to the westward of that point, track laying continued without interruption until the Colorado River was reached at the "Needles."

By the close of 1880 the line had been completed to a point 50 miles west of Isleta. During 1881 it was extended 163 miles to Navajo Spring, on the Puerco of the West, and early in 1882 to Cañon Diablo, 302 miles from Isleta.

As soon as the viaduct across Cañon Diablo was completed so that rails could be sent forward track laying was resumed, early in July, 1882, and before the close of the year the road was in operation to Ash Fork, 391 miles from Isleta. The track was completed to the "Needles," 565 miles from Isleta (575 miles from Albuquerque), on the 15th of June, 1883.

The Southern Pacific Railroad Company of California commenced the construction of its portion of the road, in 1880, at Mojave station, at the foot of Tehachapa Pass, and pushing it forward with a view to reaching the Colorado at the "Needles" at the same time with the track from the eastward, accomplished it about the last of April, 1883, the distance being 243 miles. Some delay occurred in making the connection by the carrying away of the temporary bridge across the Colorado, so that the tracks were not actually joined until some months later, but it is now complete, and trains are now running through the entire distance, a little more than 800 miles, from Isleta to Mojave.

ROUTE NEAR THE THIRTY-SECOND PARALLEL.

Among the considerations which determined the general position of this route for exploration were the low elevation of the mountain passes and their favorable topographical features, the favorable character of the surface generally, the shortness of the line from the navigable waters of the Mississippi to the Pacific, and the temperate climate on the elevated portions.

The explorations from Preston, on Red River, to the Rio Grande were conducted by Capt. John Pope, Corps of Topographical Engineers; and from the Rio Grande, near Fort Fillmore, to the Pimas villages, on the Gila, by Lieut. John G. Parke, Topographical Engineers. From the Pimas villages to the mouth of the Gila the reconnaissance in New Mexico and California of Maj. W. E. Emory, Topographical Engineers, in 1846, was used; and from the mouth of the Gila to San Francisco the exploration of Lieut. R. S. Williamson, Topographical Engineers, furnished the data.

Fulton, on the Red River, about 150 miles from the Mississippi, was considered the eastern terminus of the route, although the examination of Captain Pope extended only to Preston, 133 miles farther west. It was thought that a direct

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line from Fulton to Colorado Springs, the point on the eastern border of the Staked Plain selected by Captain Pope for crossing it, would give more favorable ground than that traversed by him between Preston and this point, which was 352 miles from Preston and 485 from Fulton.

The exploration of Captain Pope comprised three distinct belts of country, of which the above named was the first. The second was the Staked Plain, the mean elevation of which is about 4,500 feet. This presented no difficulty for 125 miles, when the Pecos River was reached. The total absence of surface water over this portion at certain seasons of the year was not deemed serious, because the geological formation was found to be such as to render probable successful artesian wells at reasonable depths, and for the further reason that a waterless distance of 125 miles was not thought to form a serious obstacle to the working of a railroad.

Between the Pecos and the Rio Grande, 163 miles, three mountain chains rise from the table-lands, the Guadalupe, Hueco, and Organ Mountains. The first could be crossed at an elevation of 5,717 feet, without a tunnel, with a grade of 108 feet to the mile for 22 miles. The second could be crossed at the Waco (Hueco) Pass under still more favorable conditions, the greatest grade being 80 feet to the mile, and the elevation of the summit 4,812 feet. The third could be turned just before reaching the Rio Grande at Molino and El Paso.

The mountains in this portion of the western part of the continent have no intervening deep secondary valleys between the main chain and the plains, and over the usual uniform and smooth surface of the latter, the general elevation of which is from 4,000 to 4,500 feet, the line entered the valley of the Rio Grande near Molino at an elevation of 3,830 feet, 787 miles from Fulton.

The region between the Rio Grande and the Pimas villages was described as a great plain, presenting no difficulty, interrupted irregularly and confusedly by bare, rugged, abrupt, isolated mountains or short ranges, around or through the passes in which a railroad might be constructed with practicable grades, the mean elevation of this plain being about 4,100 feet and the mean elevation of the summits of the passes 4,700 feet; the highest, through the Chiricahua Range, being 5,180 feet.

The scarcity of permanent supplies of water for long distances in crossing this district was fully discussed. The survey of Lieutenant Parke, made during the driest season of the year, divided the distance between the Rio Grande and the Gila into five spaces, varying from 80 to 53 miles in length, at the termination of which, respectively, were found large supplies of permanent water, and this was assumed to be sufficient, though it was thought that further and abundant supplies could be obtained by sinking wells.

Lieutenant Parke proposed that the line leave the Rio Grande near Fort Fillmore, 35 miles from Molino, and enter the valley of the Gila near the Pimas villages, the elevation above the sea being 1,365 feet; thence follow the Gila to its junction with the Colorado, a distance of 223 miles, with an easy slope and no difficulties to impede construction. San Diego would then be the nearest port in United States territory, but the difficult character of the intervening country would force the route northward to the San Gorgonio Pass, considered to be for this route the most favorable of the passes explored by Lieutenant Williamson in the Coast Range. The entrance to this pass is 133 miles from the north of the Gila in a straight line over the desert, with no difficulty in the way.

From San Gorgonio Pass San Diego and San Pedro could be reached by lines of nearly equal length. The route to San Pedro would be somewhat more favorable, and for that reason was preferred.

The length of this route from Fulton to San Pedro was stated to be 1,618 miles, the sum of ascents and descents 32,784 feet, equivalent in the working of a railroad to a horizontal distance of 621 miles, thus giving 2,239 miles as the equated distance. The estimate of the cost was $68,970,000.

For a connection with the bay of San Francisco the most direct route from the San Gorgonio Pass would be through one of the passes leading from the plain

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of Los Angeles to the valley of Salinas River. But the practicability of these passes had not been determined, and with the information in possession the bay of San Francisco must be reached by crossing the Coast Range to the Great Basin, passing over its southwestern extremity, then crossing the Sierra Nevada and descending to the Tulares Valley. The route suggested was to descend from the summit of the San Gorgonio Pass to the town of San Bernardino, then to the Mission and Low Pass of San Fernando, about 100 miles from San Gorgonio.

The San Fernando Pass is about 8 miles through. Its summit was found to be 1,949 feet above the sea, and there a tunnel of one-third of a mile in length would be required. After descending for about 4 miles the ascent to the New Pass would be begun and the summit attained in 29 miles at an elevation of 3,164 feet. Thence the descent to the Great Basin would be made, the lowest level being 2,900 feet. After that the route would lie through the Tah-ee-chay-pah (Tehachapi) Pass to the Tulares Valley, a distance of 70 miles.

The Tah-ee-chay-pah Pass, first explored by Lieut. R. S. Williamson, was found to be the most favorable in this part of the Sierra Nevada, its summit being a nearly horizontal prairie for 7½ miles, with an easy ascent for 21 miles from the Great Basin. The elevation of its entrance is 3,300 feet.

The descent to the Tulares Valley by the natural slopes was made in 15½ miles, which could be extended to 21 miles, giving easier grades and entering the valley at an elevation of 1,489 feet.

From the Tulares Valley it was practicable to reach the navigable waters of San Francisco in several ways.

The eastern side of the Tulares and San Joaquin Valleys is intersected by numerous streams from the Sierra Nevada. The western is bounded by the Coast Chain, and has but few streams. Along that part of the Tulares Valley between Kern and San Joaquin Rivers, a space of 150 miles, it would be advisable to keep near the foot slopes of the mountains. The distance between Tah-ee-chay-pah Pass and Martinez Straits would be 288 miles.

The most direct route from Tah-ee-chay-pah Pass to San Francisco would be through one of the passes in the mountain range separating the Tulares and San Joaquin Valleys from those of the Salinas and San José Rivers. The distance through it is about 10 miles. The route should cross from Tah-ee-chay-pah Pass to the western side of the Tulares Valley, around the head of the lakes, and enter the Salinas Valley as soon as practicable.

From Fulton to San Francisco the distance was stated to be 2,039 miles; the sum of the ascents and descents 42,008 feet, equivalent to 795 miles; the equated length 2,834 miles; and the estimated cost $93,120,000.

The survey of a route from the bay of San Francisco to the junction of the Gila and Colorado Rivers, connecting with the ports of San Pedro and San Diego on the one side, and on the other with the most practicable mountain passes, was intrusted to Lieutenant Williamson, assisted by Lieutenant Parke, both of the Topographical Engineers, United States Army. The examination of the middle section was made by Lieutenant Parke, and the eastern by Captain Pope, assisted by Lieutenant Garrard, of the cavalry. All these examinations, though made with small means, under disadvantageous circumstances, proved highly satisfactory.

It was remarked that the estimated influence of ascents and descents upon the expense of operating a road would be subject to increase when the minor undulations of the ground came to be measured, and would be greatest where the features of the country were least regular. The equated distances would also affect the cost of working a road only under certain circumstances, which might or might not exist upon a particular route.

Upon the whole, the Secretary was decidedly of opinion that the so-called thirty-second parallel route was "the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean." How far he was influenced in this opinion by local proclivities we have no means of ascertaining. It was known to be a favorite project of his, and the results of the examinations

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certainly tended strongly to confirm this opinion. However, the fact now is that each of the routes explored has been occupied by a completed road. In some cases the difficulties have practically disappeared under close and accurate surveys, and in all have been greatly ameliorated. A comparison of the routes as explored with those actually built upon is made on the accompanying map, and the accordance of the two cannot but be considered remarkable in view of the fact that the preliminary examinations were completed in so short a time, at so little comparative cost, with limited appliances, and over so much unknown territory. Never was money better expended by our Government, and the results have been a complete reply to the criticisms made at the time by those who opposed the expenditure (a considerable faction), and the ridicule which partisan writers and speakers sought to cast upon the so-called "picture-books" comprising the elaborate reports of the exploring parties.

The results attained never could have been accomplished except through the enthusiastic interest felt in the work by all connected with it, and it is a matter of just pride that the Army contributed in so great a degree to the direct development of these great improvements, and, through them, to the welfare of the country.

Other reasons than easier lines have also had their weight in fixing the final location of the different roads. Between the time when the explorations were made and actual construction begun many interests had arisen the tendency of which was to more or less divert the located lines from those explored. Amongst the more powerful of these were the grants of land by Congress in aid of the construction of several of the roads. Of course it at once became important in such cases that the lines should be located through lands which would have the highest market value, and would be the first to induce settlement and improvement, with resulting local business. This was a perfectly legitimate transaction, and is mentioned, not for the purpose of criticising it, but merely to show why the lines actually built upon do not in every case conform more strictly to the explored lines.

ROUTE NEAR THE THIRTY-SECOND PARALLEL AS ACTUALLY OCCUPIED.

The close accord between the explored and constructed lines along this route is quite remarkable. The Saint Louis, Iron Mountain and Southern Railroad, as it now exists, starting from Saint Louis and joined at Little Rock by the Memphis and Little Rock Railroad, passes directly through Fulton, and at Texarkana joins the Transcontinental Division of the Texas Pacific Railway; then proceeds westward to Sherman, less than 20 miles south of Preston. This division has not been extended any further to the westward, but, using the track of the Missouri, Kansas and Texas Railroad, reaches Fort Worth, at the eastern end of the Rio Grande Division of the Texas and Pacific Railway. The constructed line then gradually approaches the explored line until they are practically coincident at Colorado Springs, when they gradually diverge until they are 50 miles apart at the crossing of the Pecos, to unite again at El Paso.

Starting at San Antonio, the explored and constructed lines coincide until the divide between Devil's River and the Pecos is reached, when they diverge, the former following the Pecos until a junction is made on the boundary between Texas and New Mexico, whilst the latter pursues a more southerly route to El Paso, the greatest divergence being about 90 miles.

The explored route then followed the valley of the Rio Grande to Mesilla, and thence to the present Zuñi station of the Southern Pacific Railroad, where the constructed line direct from El Paso to that point (a distance of only 77 miles) joins it; and from there through to Tucson, Yuma, San Gorgonio Pass, Los Angeles, San Fernando Pass, and Tehachapa Pass to Goshen, a distance of 880 miles, they are almost absolutely identical. From Goshen the Central Pacific has occupied the explored line to San Francisco by way of the San Joaquin Valley; and the Southern Pacific Railroad of California has occupied a considerable portion of the other routes by way of Huron and the Santa Clara and the Salinas and Benito Valleys.

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There was no practical difficulty in the way to prevent the constructed line from occupying the explored line, and the divergences referred to have been caused entirely by other reasons.

SOUTHERN PACIFIC RAILROAD.

Because the railroad known under this name, and which occupies so much of both the thirty-fifth and thirty-second parallel routes, was mainly built from the Pacific coast *eastward*, the history of its construction is taken up at the western end.

From statements deemed trustworthy it appears that the Southern Pacific Railroad was commenced at San Francisco in the year 1865. It was chartered under the laws of California, December 2, 1865, and by its charter and the act of Congress of July 27, 1866, was authorized to construct a railroad and connect with the Atlantic and Pacific Railroad near the boundary line of the State of California, and to aid in such construction it was to have grants of land similar to those of the Atlantic and Pacific. The terms of the act of July 27, 1866, were accepted November 24, and acceptance filed in the Department of the Interior December 21, 1866. About the year 1868 it was completed to San José, 50 miles. From San José the line was pushed slowly southward for nearly 100 miles, along the Santa Clara and Salinas Valleys, a short distance from the coast, and practically along the explored line.

October 11, 1870, the Southern Pacific Railroad was consolidated with the San Francisco and San José Railroad (chartered August 8, 1860), the Santa Clara and Pajaro Valley Railroad (chartered January 2, 1868), and the California Southern Railroad (chartered January 22, 1870), under the corporate name of "The Southern Pacific Railroad Company." All these companies had been chartered by the State of California.

The object of this new corporation was to "construct and operate a line of railroad from San Francisco to a point on the Colorado River near the southeastern boundary of California, a distance of about 722 miles, with a branch from Tehachapa Pass to Colorado River at or near Fort Mojave, a distance of about 308 miles, and such other branches as the board of directors may decide to establish."

Soon after the completion of the Central Pacific Railroad that company sent out surveying parties on what is termed the Oregon Branch, and also into that portion of the State known as the Upper San Joaquin Valley. On the 13th of January, 1870, an engineering party was started from Lathrop, on the Central Pacific road, to locate a line to the southward along the San Joaquin Valley, the floor of which was found to have a remarkable uniform ascent from tide-water to the foot of the Sierra Nevada Range. The locating party continued on to Goshen, a distance of 147 miles. The road was completed to Merced, 58 miles, on April 1, 1872, and in 57 days thereafter to Fresno, 113 miles from Lathrop. On the 25th July, 1872, the road was completed and in running order to Goshen, the point where the located line of the Southern Pacific Railroad intersects it.

Between the coast line and Goshen a formidable wall of mountains intervenes (mentioned in Lieutenant Williamson's report of his exploration), and the Southern Pacific Company deemed it advisable to commence construction at the latter point, leaving a gap of 100 miles *via* the San Benito route, or 160 miles *via* the Polonio Pass route, between the northern and the southern divisions of its road, the connection being meanwhile made over the San Joaquin Branch of the Central Pacific. On July 25, 1872, the Southern Pacific was completed to Tipton, 21 miles; 21 miles more, to Delano, were added by July 14, 1873; then 29 miles, to Lerdo, August 1, 1874, and to Sumner, 23 miles, October 26, 1874. On April 26, 1875, the road was completed 22 miles farther, to the foot of the Tehachapa Mountains at Caliente, 336 miles from San Francisco. Meantime a heavy force was employed in penetrating the Sierra Nevadas through Tehachapa Pass, at an elevation of about 4,000 feet; in tunneling the Sierra Madre at San Fernando Pass, near Los Angeles, at an elevation of about 2,800 feet; and in recrossing the Sierra Madre by San Gorgonio Pass, 2,560 feet above tide.

The company was required to complete the line to Los Angeles within the year 1876, and to complete 50 miles yearly of the extension between Tehachapa

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and Yuma. To do this it was necessary to construct from the coast port of Los Angeles both ways. The section from Los Angeles northward to San Fernando, 20 miles, was finished by the 15th of April, 1874, and that from Los Angeles eastward to Spadra, 29 miles, was completed on the same day. By the 16th July, 1875, the road had been extended from Spadra to Colton, 28 miles, and on January 1, 1876, northward from San Fernando to the tunnel. May 26, 1876, the road was opened from Caliente to Keene, 13 miles, and on the 9th of August to Mojave, 32 miles farther. (At this station was subsequently started the branch to connect with the thirty-fifth parallel route.) There was now a gap of 73 miles to close before the connection with Los Angeles was complete, and this was done on the 6th September, 1876, or in less than one month. The line was then in running order to Colton, 57 miles east of Los Angeles, with branch lines from Los Angeles west to the coast at Santa Monica, 16 miles, and south to Wilmington, 21 miles, as well as southwest to the town of Anaheim, 31 miles. Everything was in excellent shape for a rapid extension of the road from Colton southeastward to Yuma, and this was done with the greatest energy.

Upon leaving San Gorgonio Pass the route entered the "Colorado Desert," where the road for 160 miles traverses a region so dry and hot that no trace of vegetation is found except a few scattering cactus plants, and at "Flowing Wells" descends 266 feet below the sea-level. Potable water is to be had at only one or two places in the entire distance. One of these was reached at Dos Palmas, 102 miles from Colton, early in 1877; and on May 23, 1877, the road reached Yuma, on the Colorado River, 191 miles from Colton, 248 miles from Los Angeles, 490 miles from Goshen, and by continuous rail 725 miles from Oakland, opposite San Francisco.

In addition to the foregoing, 40 miles of road from Goshen to Huron were completed on February 1, 1877. It is intended to eventually extend this to a connection with the lines of the Southern Pacific Railroad, thus closing the gaps which now exist and which have been already referred to.

The country east of Yuma is part of the same Colorado Desert, and for 150 miles is destitute of water, except that found in the Gila River.

The sufferings of troops, emigrants, and travelers in crossing these wastes have been terrible, and form the refrain of all who have written or told of them.

In pushing the road forward it was incumbent upon all concerned to make every possible preparation to meet the dreaded difficulties. It was necessary to organize water-trains for the use of engines, men, and animals, to accumulate materials and supplies to such an extent that the work once begun should be completed in the shortest practicable time, and to have in readiness as large a laboring force as could work to advantage. From Yuma eastward the road had no charter from Congress, and no aid from the Government except such as could be rendered by the military authorities in the way of protecting the workmen from Indian raids.

During the year 1877 the bridge was built over the Colorado at Yuma, and two new corporations were organized for the purpose of forming eastern connections with this road, one under the laws of the Territory of Arizona and the other under the laws of the Territory of New Mexico.

On the 7th of October, 1878, the Southern Pacific Railroad of Arizona was incorporated, and on the 19th of November ground was broken at Yuma, and half a mile of track was laid the same day. By January 8, 1879, the road was completed and opened to Adonde, 30 miles; on February 1, 35 miles farther; on March 3, 20 miles beyond; on March 31, to Gila Bend, 34 miles, or 120 miles from Yuma. The track reached Maricopa, 156 miles from Yuma, April 28, 1879, and then entered the valley of the Santa Cruz. May 19, the road reached Casa Grande, 183 miles from Yuma and 908 from Oakland. The desert had now been passed, and a rest was taken until January 26, 1880, when work was resumed and continued without cessation until on March 20 the track was completed to Tucson, 250 miles from Yuma. It then continued eastward, reaching Benson, 46 miles east of Tucson, on June 22, and Deming, 220 miles, on the 15th of December, where, on March 18, 1881, it was joined by the Atchison, Topeka and Santa Fé Railroad, thus forming another through line across the continent.

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The construction force kept right on from Deming, never having stopped a day after work was resumed at Casa Grande. On May 19, 1881, touching the northeast corner of the sister republic of Mexico, it reached El Paso, 1,281 miles from Oakland (1,286 from San Francisco), being the first railroad to that point and a year ahead of the requirement of its charter.

It is not a little remarkable that the first railway train to enter the isolated town of El Paso should have done so from San Francisco.

From the nature of the country traversed and the little-known conditions of the rainfall and water-courses, it had been necessary to lay the rails with great rapidity from one point of convenient water to another, and leave the important structures, such as stations and water-tanks, to be perfected afterwards. In some cases artesian wells (so called) of great depth were sunk.

Continuing eastward, the Southern Pacific formed a junction with the Texas and Pacific Railroad at Sierra Blanca, 91 miles from El Paso, on the 6th of December, 1881, and established another transcontinental line. The road was rapidly extended from Sierra Blanca towards San Antonio, to meet a westward extension of the Galveston, Harrisburg and San Antonio Railway from that place, and largely owned in the same interest. Connection was made between the two on the 12th January, 1883, thus establishing a third transcontinental route through the system of railroads concentrating at San Antonio, and bringing the Gulf cities of Galveston and New Orleans into direct relations with the Pacific coast.

This road skirts our southern boundary for more than a thousand miles, and with the branch line of the Atchison, Topeka and Santa Fé Railroad south from the vicinity of Tucson (Benson) forms a complete line of military communication along nearly the whole of the Mexican frontier, and contributes immensely to our interest in our relations with that country.

TEXAS AND PACIFIC RAILROAD AS CONSTRUCTED.

For more than 800 miles westward from the Louisiana State line this road occupies the thirty-second parallel route. The Texas Pacific Railroad Company was organized under act of Congress of March 3, 1871, and the general railroad laws of the State of Texas, and was authorized to construct a road from Marshall, Tex., *via* El Paso, through New Mexico and Arizona, to a point on the Colorado River at or near the southeastern boundary of the State, thence to San Diego, pursuing in the location throughout, as near as possible, the thirty-second parallel of latitude.

It was granted forty sections of public land per mile in the Territories and twenty sections per mile in the State of California. By the laws of Texas it became entitled to a land grant of sixteen sections per mile of road constructed in that State.

It acquired the properties of the Southern Pacific Railroad Company (of Texas) March 21, 1872, the Southern Transcontinental Railway Company March 30, 1872, and the Memphis, El Paso and Pacific Railroad Company. The Southern Pacific Railroad Company (of Texas) was a consolidation of the Vicksburg, Shreveport and Texas, chartered in Louisiana, and the Southern Pacific, organized under the laws of Texas. That portion of the line in Louisiana, about 20 miles, was built by the Vicksburg, Shreveport and Texas Company; the section from the east line of Texas to Longview, Tex., about 40 miles, by the Southern Pacific Company. The rest of the line in Texas was built by the present company.

By act of Congress of May 2, 1872, the name of the company was changed to the Texas and Pacific Railway Company.

A map of the proposed route from El Paso, Tex., to San Diego, Cal., was filed in the General Land Office September 2, 1871, but the occupation of so much of this line as lies between El Paso and Yuma by the Southern Pacific Railroad of Arizona and New Mexico having been first accomplished, that portion of the original project seems to have been abandoned for the present.

The road so far as built has been located upon a remarkably direct line, with very moderate grades and curves.

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In 1871 the route was opened for a distance of 30 miles west of Marshall, Tex., that place being also connected with Shreveport, 40 miles to the eastward. The work of construction was pushed with considerable vigor until the company became embarrassed from lack of means. However, by the 11th August, 1876, 444 miles of road were in full operation, viz, Shreveport Division, from Shreveport to Marshall, 40 miles; Southern Division, from Marshall to Fort Worth, 180 miles; Jefferson Division, from Marshall to Transcontinental Junction, 69 miles; and Transcontinental Division, from the Junction to Sherman, 155 miles. (The names of these divisions were afterwards changed.)

By the 30th of June, 1880, the road was in operation from Fort Worth westwardly, on what was then called the Rio Grande Division, a distance of 40 miles, with 56 miles yet to be built under the same contract; and the company had contracted for the building of 575 miles more, viz, on the Rio Grande Division, 520 miles, to El Paso, and from Sherman, *via* Whitesborough, to Denton, 55 miles.

During the year ending June 30, 1881, the road was extended westwardly 249 miles, or 289 from Fort Worth, and the entire line constructed from Sherman, *via* Whitesborough and Denton, to Fort Worth, a distance of 89 miles, the whole of this 338 miles being put into full operation.

By deed dated June 21, 1881, the Texas and Pacific was consolidated, under its own name, with the New Orleans Pacific Railway, extending from Shreveport to New Orleans, a distance of about 335 miles, and with the Shreveport Division added became the New Orleans Division. The names of the other divisions were changed, so that the Transcontinental Division became merged in the Eastern Division, *via* Sherman; the Jefferson Division and the Southern Division, consolidated, became the Eastern Division, *via* Marshall. Westward from Fort Worth to El Paso the name of Rio Grande Division was retained.

On December 6, 1881, the road joined the Southern Pacific at Sierra Blanca, and the railroad route by the thirty-second parallel was complete.

The Texas and Pacific and the Southern Pacific had each graded its own line from Sierra Blanca to El Paso, the two grades being often only a few yards apart. They wisely concluded to put the superstructure upon only one of the grades, and to make common use of the road thus completed.

EFFECT OF RAILWAYS UPON MILITARY OPERATIONS.

Having traced the history of the construction of the transcontinental railways from their inception to the roads in their present condition, it remains to show what their effect has been upon military operations up to this time, and what bearing they will be likely to have upon those of the future.

As early as August 15, 1836, General E. P. Gaines, United States Army, then at headquarters Western Department, Camp Sabine, writing upon the subject of internal improvements (see American Railroad Journal of October 15, 1836, page 642), expressed very broad and enlightened views, and advocated the use of railroads, canals, and steam-power for the purpose of developing our vast territory, increasing our wealth, and improving our means of defense. His idea seems to have been to construct railroads, owned by the Government, from the central portions of our domain towards its frontiers, for the purpose of the rapid transportation of men and munitions of war from points which from their position were perfectly secure from any attack to such points as might be threatened. He asserted that—

> The accomplishment of these works will render our whole country invulnerable in war, and afford an increasing revenue in war and in peace that will insure to us in from six to twelve years an amount of money equal to the whole expense of their construction.

General Gaines supported his position by arguments which doubtless seemed unduly enthusiastic at that time. These are too long to quote entire, but, as indicating the scope of his mind, it may be well to reproduce a few of them:

> The loss of a fleet at sea, or of several fleets in succession, added to the loss of our foreign commerce whilst threatened by victorious foreign fleets and armies arrayed against us from without, having our railroads and land forces held ready for action within, we should find perfect security and retain the sure elements of prosperity throughout our national domain. Whereas if we give up the proposed system of railroads, the loss of our fleets would, in effect, be nothing less than the loss of our national existence.

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This process must and will create a revenue in time of war sufficient to meet the principal expense of the war, and expense be reduced, as it will, in the great item of transportation to a saving of $ 9 out of every $10, * * * whilst the same cars will be occasionally employed in wielding the disposable force of all the Western States.

* * * * * * *

The proposed railroads, after affording every desirable facility for the most vigorous and successful defense of the country in war, and affording also a revenue sufficient to pay much of the expense of the war, will, on the return of peace, when all other of the most expensive means of national defense known to this or any other nation, such as grand fortifications, armories, arsenals, with cannon and most other military stores (however essential in war), become useless, or more than useless, during a state of peace, because they require constant repairs and an expensive force to take care of them—when these become useless or unprofitable, railroads, with steam-power applied to vehicles of land transportation, taking, as they must take, precisely the direction which the principal commerce of the country takes, viz, from the seaboard to the Central and Western States, they will afford a revenue that will grow with the growth of our population, and as bonds of union and concord to the States and the people will strengthen with our strength until every acre of our soil and every valuable mineral of our mountains and every moment of our time and all our attainments, with every effort of our labor and industry, will increase in value from 100 to 1,000 per cent. We shall then see and feel the value of practical science and of increased civilization with self-government.

We shall then have it in our power speedily to put an end to every description of war near us which tends to disturb the harmony of the civilized world, and we shall give civilization to our neighboring savages of all colors, and we shall give freedom to all whom we find capable of its enjoyment, or, in other words, capable of self-government.

General Gaines did not cease his agitation of the question with the publication of this letter, but urged his views in every direction in which he thought it possible to make an impression. In 1838 he wrote to the New Orleans Bulletin, presenting his project in some detail, as will appear from the following extract from the editorial columns of that paper:

General Gaines has kindly furnished us with a diagram of a system of railroads, planned by himself, to extend over the United States An inspection of the diagram shows Kentucky and Tennessee to be the center from which railroads branch out to all points of the Union, connecting, for instance, New Orleans with Portland, in Maine; Buffalo and Plattsburg, in New York; Detroit, in Michigan; Chicago, in Illinois; Charleston, in South Carolina; Fort Gibson, in Arkansas; Saint Louis, in Missouri; and several other points still farther to the Far West. The work, says General Gaines, is designed in time of war to enable us to wield our fighting men, with their arms and ammunition, from central and middle States to the most vulnerable points of attack on our seaboard and inland boarder in one-tenth part of the time and at one-tenth part of the expense that movements would cost on ordinary roads. It is a work, moreover, rendered indissoluble by its great and imperishable utility to the States and people in general, giving safety to our national independence, encouragement to literature and science, profitable extension to agriculture, and protection to the manufacturing and mechanic arts, thereby tending to make our beloved country prosperous and happy in peace and impregnable in war. This scheme, taken altogether, is grand and sublime, and if carried into effect would make the United States the greatest nation on earth.

Finally, under date of December 31, 1839, General Gaines memorialized Congress upon the subject of the utilization of steam-power for war purposes, and presented his project in detail. It involved the construction of—(1) floating batteries for the defense of the seaports and harbors of the United States, and (2) a system of railroads radiating from the two central States of Tennessee and Kentucky, connecting our interior areas with our frontier.

We have nothing special to consider in connection with the suggestion of floating batteries beyond the fact that they were to be iron-clad to such an extent as to make them invulnerable to the heaviest guns then afloat.

The second proposition, however, is the one he had most at heart, and expresses the conclusions he had finally reached after some years of thought. His arguments in support of his views are given at length in Report No. 86, House of Representatives, Thirty-seventh Congress, second session, pages 235 *et seq.* He was a bold man who would at that early day so earnestly advocate the construction of 4,200 miles of railroad by the Government through an organization so entirely military as the one set forth, and at an estimated cost of $64,000,000.

General Gaines was so far ahead of his military contemporaries in his conception of the possibilities of railway transportation in war time that it has been deemed proper to set forth at so much length his claim to priority. His first publication upon the subject (August 15, 1836) was made at a time when the country west of Missouri was almost unknown, when we barely touched the Pacific Ocean with our territory, and long before the most sanguine dreamed of the subsequent development of an empire beyond the then Far West.

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That the Government did not adopt his suggestions does not at all detract from their wisdom. Indeed, the rapid extension of the railroad system of our country, under the enterprise of private capital, rendered it quite unnecessary that the Government should take any active measures within the limits discussed by General Gaines; but the time did come when the General Government found it essential to its existence to seize and operate several of the very lines of road proposed by him, and a wise policy to give active as well as pecuniary aid to others which span the continent.

1. Past Operations.

When the subject of the construction of a transcontinental railway was first proposed, the Mississippi River practically constituted our western frontier, and Texas was engaged in her war of independence. The matter had been broached in Congress before that State had come into the Union. When Mr. Douglas introduced his first bill for the construction of a railway the war with Mexico had not begun. When the Mexican war closed there was not a single mile of railroad west of the Mississippi, and it was not until 1859 that the railroad system of the country was connected with the Missouri River by the completion of the Hannibal and Saint Joseph Railroad.

The Army was small, and its operations were limited to movements against the Indians in Florida, and to garrisoning posts along our northern frontier, the Mississippi River posts, those upon the southwestern frontier, and the Atlantic seaboard. The outbreak of the Mexican war called most of these garrisons into the field, and when it terminated we found ourselves with a vast accession of territory and a rapidly increasing population, having a tendency westward. As immigrants pushed into the regions beyond the Mississippi it became necessary, for their protection, to throw the troops farther out, and at the same time a new frontier appeared in the Pacific countries and along the Rio Grande. This created a demand for an increase of the Army, which came in 1855 by the organization of four new regiments, which, with the forces added to the permanent organization during the Mexican war, gave us as the organization of the regular Army one company of engineer troops, five regiments of cavalry, four regiments of artillery, and ten regiments of infantry. The greater portion of this force was kept constantly on the frontier, moving slowly out as the settlements filled in behind them and grew strong enough to take care of themselves. The frontier on the western border of the Eastern States and Territories and the eastern border of those on the Pacific coast was still well defined. Military operations were carried on by small commands over limited areas, against badly armed Indian enemies, at great cost for transportation and tremendous labor for the troops. As late as 1857 the organization of a small army for what was called the Utah campaign taxed all our resources.

Then came the civil war, with a considerable increase of the regular Army and a subsequent disbandment of hundreds of thousands of volunteers, comprising the most adventurous spirits in the land, whose restless energy ill-fitted them for any but the most active life. From their number many found their way into the haunts of the Indians, and the pressure upon the latter become so great as to cause outbreaks all along the line. Although our Army had been trebled, yet the troops were all employed in guarding the settlers. Their operations were still limited by the difficulty and cost of transporting the requisite supplies.

Finally, the construction of the transcontinental railways was begun, and our frontier commenced its movement along the routes of the several roads, and continued until it became a series of lines extending across the continent, each having a frontier looking to the north and to the south. It became easier to supply the troops, and rapid movements characterized all military operations, until Indian outbreaks were reduced from wars to mere raids of short duration, and the Army was reduced to half its previous number. With the aid of the railroads it is now practicable to accomplish more with a hundred men than was formerly possible with a thousand. But we have meanwhile been going through a series of conflicts,

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growing out of the encroachment of the settlements upon the hunting grounds of the Indians, that taxed every facility and made necessary every soldier we have had. Upon the part of the Indians it was a struggle for existence after the traditions of their race, but the struggle is about ended, and they are face to face with the question whether they shall adopt the white man's methods or perish. Numbering probably not more than 300,000, they occupied an area capable of supporting many millions, and claimed their right to do so, without recognizing the rights of others to equal existence. They added nothing to the sum of human happiness, made no progress in civilization, built no churches, opened no schools, cultivated no ground. If the Army, aided by the railroads, has brought this state of affairs to an end, so much the better for all concerned. The Indians are not decreasing in number; they are only more restricted in their habits. They are on the way to a higher civilization, and with the help that is due them from the white man will accomplish it. This has been attained by a wise policy upon the part of the Government in extending material aid to railroads. Suppose it has cost us large sums in bonds and grants of lands, the investment has been a good one; an opposite course would have cost much more. Estimate the cost at $400,000,000, the saving in mere money in forty years, supposing the same ends could have been gained without the railroads, would amount to as much or more.

Whilst the uses of the westward extensions of the railway system have been of such great importance in dealing with the Indian question, the railroads existing in the settled portions of the country had the most vital bearing upon military operations during the civil war of 1861–'65. It enabled both parties to that conflict to put into the field armies of such magnitude as had been theretofore unknown in civil wars. This was due to the fact that it was possible to supply them over distances which would have otherwise been impracticable with such wagon-roads as then existed. The immediate effect of railway transportation was observable in the highest degree during the Atlanta campaign, when more than a hundred thousand men, with a due proportion of animals, were kept fully supplied at a distance of four hundred miles or more from its base on the Ohio River. All who took part in the campaign will remember with what solicitude that long, slender line of rails was guarded, and what conspicuous gallantry was exhibited on several occasions when guards defended their charge to the utmost, well knowing its importance. But the delivery of supplies from the base was only a small portion of the work done by the railways, since they served to collect them from every imaginable quarter and afforded ready and rapid transportation to the point of concentration. It is not too much to say that without the railways such a campaign with so large a force would have been impracticable.

The foregoing is given as the most prominent illustration in our own history. Neither our policy nor our experience indicates such elaborate preparation for the military use of railways as obtains in foreign countries.

During the civil war the military authorities operated fifty railroads, having an aggregate length of 2,630 miles, with 433 engines and 6,605 cars.

2. Future Operations.

It is not so easy to point out the effect which our extensive railway system will have upon future military operations, nor would it perhaps be wise to go into a comprehensive discussion of the subject. But there are certain considerations which may well be presented. The first of these relates to the numbers which our country in case of need can put into the field and supply.

Our population is now sufficiently great to admit of the formation of armies of any size that may be desired. Our railway mileage is in the neighborhood of 115,000 miles, penetrating every part of our vast domain, and especially those regions from which supplies would be drawn. It is not probable that a foreign foe will ever undertake an invasion of our country, but should such an event occur we would not be called upon to organize forces at all comparable in number with those used during the civil war, and the ease with which they could be supplied goes without saying. With our great extent of vulnerable coast it would be a

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simple matter for an enemy to land an invading force, but before it could be prepared to move inland it would be opposed by an army amply sufficient to destroy it, drawn from every direction and concentrated by means of the railways. With harmony existing among our people, as at present, a successful invasion of our territory may well be considered impracticable.

Second, our aggressive power has been magnified almost beyond conception. We now have a completed railway along each of our land frontiers, and these will serve to prevent any invasion by land into the sparsely settled portions of our country, whilst they afford us the means of invading the neighboring territory at any point we please. In case of a war with a foreign power, involving either of our neighbors, our true policy would be to take the offensive at once, with armies sufficient to overwhelm our enemy in the shortest time and overrun his country. This condition of things must grow more favorable to us with each mile of railway constructed to an intersection with either the Northern Pacific or the Southern Pacific Railroad, the two great military lines, and it is the part of wisdom to encourage all such constructions, as well as all roads leading from these two main lines to our frontiers.

God forbid that we should ever find it necessary to use these railways for war purposes. Far better that they always bear the burdens of peaceful commerce, and thus serve to improve the cordial relations now existing. But if the time should come when their use as auxiliaries is required, their value will be inestimable.

All reference to the railroad systems of our neighbors is purposely omitted.

Third, the extension of railroads into the regions heretofore occupied by the Indians indicates a different distribution of our small Army, which should be concentrated at comfortable posts of considerable size, located in the vicinity of the railroads. Distributed in this manner, the troops can be more readily instructed and disciplined, they can be supplied and maintained at a great reduction of cost, and will always be ready in sufficient numbers to be transported by rail to the best point without waiting for concentration. By this course an Indian campaign ought to be completed in as many weeks as it formerly required months. And with the same Army a larger force can take the field, or if the force now used in the field be considered sufficient, the aggregate of the Army can be reduced. The localities where troops may be needed are diminishing in number from year to year, and it will not be long before a mere guard to look after the public property will be all that will be required at most of them.

Fourth, by a free use of railroad rather than wagon transportation the cost of this large item of Army administration will be largely reduced. This is practicable only when the troops are stationed on or near the railroads. Celerity of movement being of the first importance, it is desirable to attain it even if the cost be not reduced. When it can be obtained, and at the same time at less cost, so much the better. The way to do this is to concentrate the troops at posts in the vicinity of the railroads.

Those whose duty it is to attend to the matters of supply and transportation should make a special and continued study of this subject, with a view to the readiest and most complete utilization of the facilities afforded by the railways.

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A.—*Statement showing rates for passengers and freight paid in currency by the Quartermaster's Department for the transportation of United States troops and military stores between New York City and San Francisco via the Isthmus of Panama, from January 1, 1855, to June 30, 1883.*

Year.	Officers.	Soldiers.	Stores.	Remarks.
1855	$300.00	$125.00	No payment for freight found	
1856	300.00	125.00	do	
1857	300.00	100.00	do	
	275.00	125.00		
1858	300.00	145.00	Baggage in excess of 50 pounds 20 cents per pound.	
		125.00		
1859	120.00	57.00	Baggage in excess of 50 pounds 10 cents per pound.	To Vancouver: Officers, $140; soldiers, $65.
1860	190.00	75.00	do	
			Stores, 18 cents per pound	
1861	225.00	100.00	do	New York to San Francisco.
	250.00	125.00	Ordnance stores, $3.50 per cubic foot	San Francisco to New York.
1862	250.00	125.00	Merchandise, $3.50 per cubic foot	San Francisco to New York.
			Merchandise stores, 10 cents per pound	
			Fast freight, 10 cents per pound	
1863	250.00			
	225.00			
1864	250.00	175.00		
		100.00		
1865	375.00	200.00		
	300.00	100.00		
	192.50	52.50		
1866	300.00	100.00	$2.70 currency per cubic foot	For a portion of this year $250 per officer and $75 per soldier.
1867	250.00	75.00	10 cents per pound for all in excess of 50 pounds.	
1868	100.00	45.00	10 cents per pound in excess of 100 pounds.	
			Merchandise, $1.65 per cubic foot	
1869	225.00	75.00	Merchandise, fast freight, $3.50 per cubic foot.	Premium gold, 38½ per cent.
			Merchandise, slow freight, $1.50 per cubic foot.	Premium gold, 38½ per cent.
			Merchandise, slow freight, $1.00 per cubic foot.	Premium gold, 13⅞ per cent.
1870	150.00	60.00		
1871	150.00	60.00	Merchandise, slow freight, $1.00 per cubic foot.	Premium gold, 11 per cent.
1872	(*)		Ordnance stores, fast freight, $1.50 per cubic foot.	Gold, $1.14.
1873	(†)	60.00	Merchandise, slow freight, $1.00 per cubic foot.	Gold, $1.17½.

*No payment found. †No payment.

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B.—*Statement showing rates paid in currency by the Quartermaster's Department for the transportation of United States military stores between New York City and San Francisco via Cape Horn from* 1855 *to* 1864.

Year.	Per 100 pounds.	Remarks.
1855	$2.00	60 cents per cubic foot.
1856	1,059, or $21.18 per ton.	Heavy freight. Light freight, 37½ cents per cubic foot.
1857	1.50 1.20	Fixed ammunition. Powder.
1858		Subsistence stores, $2.60 per barrel; boxes, 30 cents per cubic foot.
1859	0.50	Ordnance stores. Miscellaneous stores, 25 cents per cubic foot.
1860	2.50 0.50	Loose muskets. Shells. Miscellaneous stores, 30 cents per cubic foot.
1861		Miscellaneous stores, 30 cents per cubic foot.
1862	0.75	Miscellaneous stores. Ordnance stores, 32½ cents per cubic foot; per barrel, $1.50.
1863	0.75	Do.
1864	1.25	Do. Pig lead. Ordnance stores, 40 cents per cubic foot; powder, 50 cents, and subsistence stores, 35 cents per cubic foot.

C.—*Statement showing rates paid in currency by the Quartermaster's Department for the transportation, by wagon, of United States military stores between Fort Leavenworth, Kans., and Fort Union, N. Mex., from* 1855 *to* 1870.

Year.	Per 100 lbs. per 100 miles.	Remarks.	Year.	Per 100 lbs. per 100 miles.	Remarks.
1855	$2.24	Average April to December, inclusive.	1863	$1.84	Average entire year.
1856	2.32	Average entire year.	1864	2.03	Average June to December, inclusive.
1857	2.15	Average March to December, inclusive.	1865	2.00	Average entire year.
1858	2.10	Average entire year.	1866	1.38	Do.
1859	2.00	Do.	1867	1.40	Do.
1860	1.46	Average May to December, inclusive.	1868	1.42	Average April to December, inclusive.
1861	1.40	Average entire year.	1869	1.47	Average entire year.
1862	1.65	Do.	1870	1.43	Do.

D.—*Statement showing rates for passengers and freight paid in currency by the Quartermaster's Department for the transportation of U. S. troops and military stores between New York City and San Francisco via the Pacific railroads from the date of their opening for transportation to* 1883.

Year.	Officers and soldiers.	Stores pr. 100 lbs., 3d-class rates being about the average of all.	Year.	Officers and soldiers.	Stores pr. 100 lbs., 3d-class rates being about the average of all.
1869	$142.00	$5.77	1877	$139.00	$4.00
1870	144.95	5.30	1878	139.00	4.00
1871	140.00	4.70	1879	140.00	4.00
1872	140.00	4.85	1880	138.00	4.00
1873	140.00	4.85	1881	138.00	4.00
1874	139.50	1.90	1882	141.80	4.00
1875	138.00	4.00	1883	137.35	4.00
1876	138.00	4.00			

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E.—*Cost of transporting troops, &c., reported by the Quartermaster-General November* 16, 1854.

To San Francisco, via the Isthmus:*

Transportation (cost):

Each commissioned officer	$225
Each enlisted man, laundress, &c	150

Subsistence:

The whole subsisted by contractor.

Baggage (allowance):

Each person on the steamer ....pounds..	100
Each person across the isthmus .....do....	25

All over the 25 pounds across the isthmus to be paid for at 15 cents per pound.

From San Francisco to Vancouver, or Oregon, in June, 1853:

Transportation (cost):

Each commissioned officer	$75
Each enlisted soldier, &c	40

Stores (cost):

Per ton (in June, 1853)	30
In December, 1853, per ton	15
In February, 1854, per ton	20

From New Orleans to San Francisco:

Transportation (cost):

For each officer	$300
Each enlisted soldier	150

Including transit of isthmus.

Baggage:

Extra baggage, 15 cents per pound.

Provisions to San Francisco or Fort Vancouver via the Isthmus:

To Aspinwall, per ton	$14
Across the isthmus, per ton	300
From Panama to San Francisco, per ton	80

Say, $394 a ton of 2,000 pounds.

Agents of the line think that when the railroad across the isthmus shall be completed the freight across will not exceed one-fourth of the above, $75 a ton, say, $169 for the whole distance via Cape Horn to San Francisco or Benicia.

From Baltimore, 90 cents per cubic foot, $4.50 per flour barrel.

From New York, $3.70 per barrel for flour, 60 cents per cubic foot for other packages.

Same rates apply to camp and garrison equipage and clothing, as all such freight by sea-going vessels is charged for by the cubic foot.

ORDNANCE AND ORDNANCE STORES.

From New York via Cape Horn:

Heavy ordnance:

In June, 1854, per pound	2 cents.
In August, per ton	$28.00
In October, per pound	2 cents.

Ammunition:

Ammunition, and other boxes, &c., per cubic foot	60 cents.

(None sent via the isthmus.)

CONTRACTS FOR TRANSPORTATION OF MILITARY STORES OF ALL KINDS.

From Fort Leavenworth to El Paso, per 100 pounds	$14.00
From Fort Leavenworth to Fort Fillmore, per 100 pounds	13.75
From Fort Leavenworth to Albuquerque, per 100 pounds	10.83
From Fort Leavenworth to Fort Union, per 100 pounds	7.96

Transportation to Albuquerque estimated at about $15 per man.

TRANSPORTATION OF ARTILLERY AND SUPPLIES.

From Albany to the different points on the frontier at rate of $5 each ton (the daily cost of a wagon and team) for each ten miles, when roads were in best condition—double this in spring and fall of the year—say from 50 cents to $1 a mile for each ton transported. Heavy freight can now (November 16, 1854) be sent to San Francisco at about $15 a ton, and 30 cents per foot for measurement goods, and that a vessel could be chartered for Fort Vancouver at $20 per ton.

* In May, 1854.

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F.—*Pacific Railroad lines.*

[An abstract of the history of the construction of the four great routes.]

DEPARTMENT OF THE INTERIOR,
OFFICE OF COMMISSIONER OF RAILROADS,
Washington, August 9, 1883.

SIR: In answer to a communication addressed to the Commissioner of Railroads, July 10, 1883, by Brig.-Gen. O. M. Poe, aid-de-camp to the General of the Army, in which he requests there be furnished him certain information touching the history of the construction of the "transcontinental lines of railroad," I have the honor to submit the following statement, and to request the same be transmitted to him.

The railroads treated of are the Union Pacific and Central Pacific, the Atlantic and Pacific and Southern Pacific, the Texas and Pacific and Southern Pacific of New Mexico, Arizona, and California, and the Northern Pacific. I have endeavored to confine the matter as far as practicable, to that concerning the main lines only, so far as the construction is concerned. In the account given of the business progress the figures represent the operations and equipment of the entire line, unless otherwise specified, as the reports of the companies are made upon that basis.

RAILROAD GRANTS.

On March 2, 1827, Congress granted to the State of Illinois certain lands in aid of the construction of a canal to "connect the waters of Illinois and Lake Michigan." (4 Stat., 234.)

The above act was amended March 2, 1833, and "railroad" substituted for "canal." (4 Stat., 662.)

The first right of way through public lands for a railroad was granted to a Florida company March 3, 1835. (4 Stat., 778.)

The first important railroad act was that of September 20, 1850, "An act granting the right of way and making a grant of land to the States of Illinois, Mississippi, and Alabama, in aid of the construction of a railroad from Chicago to Mobile." (9 Stat., 466.)

Between the date of this act and 1862, when the first Pacific railroad company was incorporated, Congress passed several railroad-grant acts similar in tenor to the act of 1850. (H. R. Ex. Doc. 47, part 4, page 274, Forty-sixth Congress, third session.)

CAUSES WHICH LED TO THE BUILDING OF PACIFIC RAILROADS.

As early as 1838 a public meeting was held at Dubuque, Iowa, for the purpose of expressing opinions favorable to the construction of a railroad to the Pacific coast. (H. R. Ex. Doc. 47, p. 265.)

Public attention was again directed to it, and interest revived about the time of the settlement of the Webster-Ashburton treaty. (H. R. Ex. Doc. 47, p. 265.)

In 1845 Senator Douglas made an address favoring such a project, and prepared bills to promote it by governmental aid. (H. R. Ex. Doc. 47, p. 266.)

A number of like measures were introduced in Congress between the years 1850 and 1862.

Government surveys were authorized by an act of Congress of March 3, 1853, for the purpose of ascertaining the most practicable and economical route for a railroad to the Pacific Ocean. (10 Stat., 219.) These surveys were made under the direction of the War Department during the years 1853 to 1856.

POLITICAL ACTION.

Pending the campaign of 1856 mass meetings were held and legislators petitioned, so strong was the popular desire to have Congress take some definite action to promote the building of a railroad across the continent.

Both the Republican and Democratic parties adopted resolutions in their conventions of 1856, and again in 1860, pledging themselves in support of it.

The Presidential candidates favored it in their speeches, and Presidents Buchanan and Lincoln in their messages to Congress recommended legislative aid. (H. R. Ex. Doc. 47, Part 4, pages 266–7, Forty-sixth Congress, third session.)

All these forces bearing upon Congress led to the enactment of a law entitled "An act to aid in the construction of a railroad and telegraph line from the Missouri River to the Pacific Ocean, and to secure to the Government the use of the same for postal, military, and other purposes."

This act was passed July 1, 1862, and was the charter act of the Union Pacific Railroad Company. (12 Stat., 489.)

UNION PACIFIC RAILROAD.

Main line, Omaha, Nebr., to Ogden, Utah, 1,032 miles.

The act of incorporation was formally accepted by the company September 2, 1862, and the acceptance filed in the Department of the Interior June 26, 1863.

For important amendments to original act see act of July 2, 1866 (13 Stat., 356), and act of May 7, 1878 (21 Stat., 56). See also table on page 274 of H. R. Ex. Doc. 47, part 4, for other acts bearing upon this railroad.

CONSTRUCTION OF THE ROAD.

The chief engineer of the road, in his report to the president of the company, dated December 1, 1869, says:

"In 1863 and 1864 surveys were inaugurated, but in 1866 the country was systematically occupied, and day and night, summer and winter, the explorations were pushed forward through dangers and hardships that very few at this date appreciate. As every mile had to be run within the range of the musket there was not a moment's security.

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"In making the surveys numbers of our men, some of them the ablest and most promising, were killed, and during the construction our stock was run off by the hundreds, I might add by the thousands. Each day taught us lessons by which we profited the next, and our advances and improvements in the art of railway construction were marked by the progress of the work—forty miles of track having been laid in 1865; two hundred and sixty in 1866; two hundred and forty in 1867, including the ascent to the summit of the Rocky Mountains at an elevation of eight thousand two hundred and thirty-five feet above the ocean; and during 1868, and to May 10, 1869, five hundred and fifty-five miles (were built), all exclusive of side and temporary tracks, of which over one hundred and eighty miles were built in addition.

"The first grading was done in the autumn of 1864, and the first rail laid in July, 1865. * * * All the material and supplies for construction had to be transported hundreds and thousands of miles by teams, or at best by steamboats."

He says further that the lack of confidence in the project, even in the localities to be the most benefited, was so great that the laborers demanded their pay in advance before they would perform a day's work.

The map showing the definite location of the first one hundred miles of road was filed in the General Land Office October 24, 1864; it was amended December 14, 1864.

The map showing the location of the last, or thirteenth hundred mile west from Omaha, was filed January 8, 1869.

Maps showing location of routes between Promontory Summit and Monument Point, Utah, May 10, 1869.

The dates of acceptance of completed sections by the President are as follows:

	Distance.	Date.
	Miles.	
Omaha to 40th mile-post	40	Jan. 24, 1866.
40th to 65th mile-post	25	May 1, 1866.
65th to 105th mile-post	40	June 25, 1866.
105th to 125th mile-post	20	July 12, 1866.
125th to 160th mile-post	35	Aug. 8, 1866.
160th to 205th mile-post	45	Sept. 8, 1866.
205th to 240th mile-post	35	Oct. 12, 1866.
240th to 270th mile-post	30	Nov. 6, 1866.
270th to 305th mile-post	35	Jan. 2, 1867.
305th to 345th mile-post	40	June 10, 1867.
345th to 385th mile-post	40	July 5, 1867.
385th to 420th mile-post	35	Aug. 27, 1867.
420th to 455th mile-post	35	Oct. 1, 1867.
455th to 490th mile-post	35	Nov. 4, 1867.
490th to 510th mile-post	20	Dec. 11, 1867.
510th to 540th mile-post	30	Jan. 25, 1868.
540th to 560th mile-post	20	May 25, 1868.
560th to 580th mile-post	20	May 16, 1868.
580th to 600th mile-post	20	June 12, 1868.
600th to 620th mile-post	20	June 16, 1868.
620th to 640th mile-post	20	July 21, 1868.
640th to 660th mile-post	20	July 23, 1868.
660th to 680th mile-post	20	July 23, 1868.
680th to 700th mile-post	20	Aug. 8, 1868.
700th to 720th mile-post	20	Aug. 27, 1868.
720th to 740th mile-post	20	Sept. 5, 1868
740th to 760th mile-post	20	Sept. 5, 1868.
760th to 780th mile-post	20	Sept. 28, 1868.
780th to 800th mile-post	20	Oct. 21, 1868.
800th to 820th mile-post	20	Nov. 19, 1868
820th to 860th mile-post	40	Dec. 5, 1868.
860th to 880th mile-post	20	Dec. 12, 1868.
880th to 900th mile-post	20	Dec. 16, 1868.
900th to 920th mile-post	20	Dec. 23, 1868.
920th to 940th mile-post	20	Dec 23, 1868.
940th to 960th mile-post	20	Jan. 28, 1869.
960th to 980th mile-post	20	Feb. 9, 1869.
980th to 1000th mile-post	20	Feb. 9, 1869.
1000th to 1085.88 mile-post	85.88	July 15, 1869.

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By a joint resolution of April 10, 1869 (16 Stat., 56), it was provided that the common terminus of the Union and Central Pacific Railroads should be at or near Ogden, Utah, and that the Union Pacific Railroad Company should build, and the Central Pacific Company pay for and own, the road from Promontory Summit, 53 miles west from Ogden, from which place said roads should form one continuous line.

The number of miles of road constructed and occupied during each governmental fiscal year was as follows:

Year ending June 30:

1866	105
1867	240
1868	275
1869	380
1870	85.88

OPERATIONS OF THE ROAD.

Up to April 1, 1867, the road was run by the contractors for the line. Since that time it has been run by the company. Its earnings for the quarter ending July 31, 1867, were as follows:

From passenger business	$160,526 92
freight business	549,672 39
transporting mails	13,556 23
Material, &c., for construction	479,283 41
Total	1,203,038 95
Expenses for same period	395,530 92
Net balance	807,508 03

(See Poor's Railroad Manual, 1868–'69, p. 47.)

According to the annual report of the company for the year ending December 31, 1870, its earnings were from—

Passengers	$3,818,627 55
Freight	3,058,514 71
Mail	274,513,58
Express	281,691 76
Miscellaneous	191,929 53
Total	7,625,277 13
Expenses (operating)	4,677,414 84
Net earnings	2,947,862 29
Number of passengers carried one mile	74,917,335
tons of freight carried one mile	71,779,106

ROLLING STOCK BELONGING TO COMPANY.

Locomotive engines	150
Passenger cars	25
Passenger cars, emigrant, and caboose	84
Baggage cars	11
Mail cars	8
Express cars	8
Freight cars	2,319
Stock cars	48
All others	58

The following tables, compiled from the company's annual reports, show the operations of the road for several different years:

EARNINGS.	1873.	1876.	1879.	1882.
Passengers	$3,887,204 48	$4,307,602 53	$4,406,797 34	$5,197,730 01
Freight	5,516,907 58	7,304,123 50	12,067,395 26	15,402,167 37
Mail	283,855 00	574,139 00	685,712 70	746,515 61
Express	410,190 76	502,738 42	496,218 28	748,932 30
Miscellaneous	167,945 84	198,255 39	384,142 50	728,538 95
Total	10,266,103 66	12,886,858 84	18,040,266 08	22,823,884 24
Expenses (operating)	4,974,861 02	5,268,211 20	8,368,836 96	10,727,049 48
Net earnings	5,291,242 64	7,618,647 64	9,671,429 12	12,096,834 76

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Number of passengers carried one mile:

1873	95,709,054
1876	128,032,924
1879	100,151,148
1882	157,527,336

Tons of freight carried one mile:

1873	223,361,542
1876	292,002,076
1879	436,054,149
1882	732,791,054

EQUIPMENT.	1873.	1876.	1879.	1882.
Locomotive engines	151	168	178	344
Passenger cars	97	128	126	120
Sleeping cars				92
Baggage cars	13	21	21	34
Mail cars	9	9	9	8
Express cars	9	9	9	20
Freight cars	2,310	2,940	2,933	6,201
Stock cars	107	120	287	739
Combination—mail, baggage, and express				20

(Figures for 1873 are from Poor's Manual.)

The Union Pacific Railroad Company, the Kansas Pacific Railway Company, and the Denver Pacific Railway and Telegraph Company were consolidated on January 24, 1880, and formed the

UNION PACIFIC RAILWAY COMPANY.

The number of miles of railroad acquired by this consolidation was as follows:

Council Bluffs to Ogden (including Omaha Bridge and approaches)	1,037.4
Ogden to Junction Central Pacific Railroad	5
Kansas City to Denver	638.5
Denver to Cheyenne	106
Leavenworth to Lawrence	34
Total	1,820.9

For the number of miles owned and operated at last report see Report of Commissioner of Railroads for 1881, page 37. (No change was made up to time of 1882 report.)

The records of the General Land Office show the following number of acres of land as having been certified or patented during each of the years given below (act July 1, 1882):

For the year ending June 30—

1871	639,024
1873	15,395.2
1874	50,733.3
1875	919,771.41
1876	219,344.09
1877	39,211.58
1878	1,842.47
1881	640
1882	67,921.03
1883	640
Total up to June 30, 1883	1,954,523.08

For condition of the bond and interest and sinking fund accounts see Report of the Commissioner of Railroads for 1882, pages 10 and 11 to 16. Reports of inspection of this road for same year will be found on pages 28 to 36, and 71 to 75.

The reports of the Auditor of Railroad Accounts for 1878, 1879, and 1880, and those of the Commissioner of Railroads for 1881 and 1882, containing matter collected from the reports of the company and inspection trips taken by members of the bureau, will furnish much additional matter of interest.

CENTRAL PACIFIC RAILROAD.

Main line of road: San Francisco to Ogden, Utah, 883.06 miles.

The Central Pacific Railroad Company of California was organized under the general railroad law of California, with authority to construct a railroad from Sacramento to the eastern boundary of that State.

By the act of July 1, 1862 (12 Stat., 489), it was authorized to construct a line from the Pacific coast, at or near San Francisco, or the navigable waters of the Sacramento River, to the eastern boundary of the State, upon the same terms and conditions granted the Union Pacific Railroad Company; and it

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further provides that it may continue in constructing, under same conditions, after completing its road across the State, through the Territories, until it shall meet and connect with the last-named road.

The conditions of this act were accepted October 7, 1862, and acceptance filed in the Department of the Interior December 24, 1862.

Construction was commenced in February, 1863, and by January, 1865, 31 miles of road had been opened; September 4, 1865, 66 miles; November 10, 1866, 94 miles; July, 1867, 105 miles; and by January, 1868, to the eastern boundary of the State, or 138 miles.

In 1868 362 miles were constructed, and the line was opened to Ogden May 15, 1869, thus, in connection with the Union Pacific, making a continuous line of railroad across the continent.

The Sierra Nevada mountains are crossed at an elevation of 7,042 feet above the level of the sea, the grade averaging from 75 to 105 feet.

The first map of definite location of the line of this road was filed in the General Land Office October 20, 1864, "From Sacramento, Cal., to a point 50 miles east thereof." The sixth and last map was filed October 20, 1868.

Maps of construction have been filed with affidavits of the chief engineer of the company, bearing the dates following:

	Distance.	Date.
	Miles.	
Sacramento, Cal., to the 31st mile-post	31	Oct. 19, 1865.
31st to 74th mile-post	43	Sept. 28, 1866.
74th to 94th mile-post	20	Oct. 1, 1867.
94th to 114th mile-post	20	June 16, 1868.
114th to 138th mile-post	24	Nov. 14, 1867.
138th to 158th mile-post	20	May 2, 1868.
158th to 178th mile-post	20	July 2, 1868.
178th to 215th mile post	37	July 28, 1868.
215th to 255th mile-post	40	Aug. 8, 1868.
255th to 290th mile-post	35	Aug. 29, 1868.
290th to 310th mile post	20	Sept. 7, 1868.
310th to 330th mile-post	20	Sept. 10, 1868.
330th to 350th mile-post	20	Sept. 26, 1868.
350th to 370th mile-post	20	Oct. 16, 1868.
370th to 390th mile-post	20	Oct. 16, 1868.
390th to 410th mile-post	20	Nov. 12, 1868.
410th to 430th mile-post	20	Nov. 13, 1868.
430th to 450th mile-post	20	Dec. 28, 1868.
450th to 470th mile-post	20	Dec. 24, 1868.
470th to 490th mile-post	20	Jan. 8, 1869.
490th to 510th mile-post	20	Jan. 28, 1869.
510th to 530th mile-post	20	Feb. 6, 1869.
530th to 550th mile-post	20	Feb. 16, 1869.
550th to 570th mile-post	20	Mar. 12, 1869.
570th to 610th mile-post	40	Mar. 30, 1869.
610th to 630th mile-post	20	Apr. 5, 1869.
630th to 650th mile-post	20	Apr. 13, 1869.
650th to 670th mile-post	20	Apr. 28, 1869.
670th to 690.3th mile-post	20.3	May 6, 1869

From the 690 3 mile-post to Ogden, Utah, a distance of 53 miles, the road was constructed by the Union Pacific Railroad Company.

The number of miles constructed during each fiscal year was as follows:

Year ending June 30:

1866	31
1867	43
1868	81
1869	532.3

On August 22, 1870, the Central Pacific Railroad Company, the California and Oregon, the San Francisco and Oakland, the San Francisco and Alameda, and the San Joaquin Valley railroads were consolidated under the title of

THE CENTRAL PACIFIC RAILROAD COMPANY.

The following statement from Poor's Railroad Manual for 1871–'72, page 385, shows the operations of the road for the year 1870, also the equipment:

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Gross earnings:

Passenger	$4,044,372 05
Freight	3,508,892 09
Other	367,446 84
Total	7,920,710 98
Operating expenses (including taxes)	4,060,564 95
Net earnings	3,860,146 03

Equipment:

Locomotive engines	179
Passenger cars	172
Sleeping cars	21
Mail and express cars	9
Baggage cars	24
Freight cars	3,200
Other cars	445
Snow-plows	7

The following tables are taken from the annual reports of the company:

EARNINGS.	1873.	1876.	1879.	1882.
Freight	$7,462,894 92	$10,773,618 34	$10,934,573 39	$16,302,882 72
Passenger	4,418,417 42	5,908,821 58	4,919,254 63	7,474,216 12
Express	213,036 90	266,805 73	208,500 79	350,288 21
Mail	269,014 28	250,638 34	417,347 23	613,180 88
Miscellaneous	500 589 40	947,060 38	673,487 12	922,191 19
Total	12,863,952 92	18,146,944 37	17,153,163 16	25,662,757 12
Operating expenses	4,969,271,52	8,732,074 90	11,126,298 10	16,067,183 67
Net earnings	7,894,681 46	9,414,869 47	6,026,865 06	9,595,573 45
Passengers carried	3,280,171	5,772,659	6,842,307	7,868,614
Pounds of freight carried	2,057,204,628	2,886,171,174	3,750,687,240	6,219,392,940

EQUIPMENT, OWNED AND LEASED.	1873.	1876.	1879.	1882.
Locomotive engines	188	228	264	314
Passenger cars	147	190	262	465
Freight cars	3,709	4,668	5,344	9,767
Baggage cars	21	27	48	69
Mail and express cars	19	22	20	35
Sleeping cars	23	41	41	53

Earnings and expenses for 1873 are given in aggregate, gold and currency. Average premium on gold, 12.92 per cent. Currency receipts were sold at a discount of $592,814.97. Net earnings in currency were $8,245,302.54. Figures for the other years are given in currency.

In addition to the car equipment shown above, the company owns a complement of construction, wrecking, and hand cars, and snow-plows.

For their ferry at San Francisco they have a fleet of nine steamers, having an aggregate tonnage of 12,982, besides four river steamers and three barges.

The records of the General Land Office give, as the number of acres of land certified or patented during each governmental fiscal year, the following figures:

Year ending June 30:

1866	45,510.54
1867	77,257.46
1868	21,618.63
1870	117,138.70
1871	9,480.52
1872	160
1875	70,247.39
1876	82.79
1877	352,662.96
1878	14,703.18
1881	12,572.51
1883	59,444.72
Total (Central Pacific proper)	780,879.40

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For condition of the bond and interest and sinking fund accounts, and other matter of interest, in connection herewith, see reports of the Commissioner of Railroads and Auditor of Railroad Accounts, as cited for the Union Pacific.

The foregoing matter furnishes an abstract of the history of construction of the main stem of what might be called the central transcontinental line. The figures showing operation, equipment, &c., are those for the whole lines, owned and leased.

The next line to be considered properly as transcontinental is the

Atlantic and Pacific.

Line of road.

Springfield, Mo., along the thirty-fifth parallel to the Pacific Ocean, about 2,000 miles.

The Atlantic and Pacific Railroad Company was chartered by an act of Congress passed July 27, 1866: "An act granting lands to aid in the construction of a railroad and telegraph line from the States of Missouri and Arkansas to the Pacific Ocean." (14 Stat., 292.)

This act was accepted November 22, 1866, and acceptance filed in the Department of the Interior November 27, 1866.

On October 25, 1870, this company was consolidated with the South Pacific Railroad Company (originally the Southwest Branch of the Pacific Railroad of Missouri), which was organized under provisions of an act of the general assembly of Missouri March 7, 1868. The South Pacific received a grant of lands under an act of Congress approved July 10, 1852. (10 Stat., 8.)

The Pacific Railroad of Missouri and all its leased lines were leased to the Atlantic and Pacific Railroad Company July 1, 1872, for a term of 999 years.

A tripartite agreement between this company and the Saint Louis and San Francisco and the Atchison, Topeka and Santa Fé Companies, January 31, 1880, provided for the immediate construction of that portion of the road from the Rio Grande River to the Pacific Ocean—or the Western Division.

The work of construction was commenced at Albuquerque, N. Mex., in May, 1880; track laying was begun in July of the same year, and with the exception of six months' delay in the first half of 1882, caused by the impossibility of getting material across Cañon Diablo, has continued without interruption.

The first map of definite location was filed in the General Land Office December 10, 1870, "From Springfield, Mo., to Neosho, Mo." The last map for main line was filed August 15, 1872.

Construction.

Affidavits of the chief engineer of the company, on file in the General Land Office, give dates of completion of sections as follows:

	Distance.	Date.
	Miles.	
First 25 miles west from Springfield	25	Sept. 27, 1870.
Second 25 miles west from Springfield	25	Sept. 27, 1870.
Third 25 miles west from Springfield	25	Dec. 29, 1870.
Fourth 25 miles west from Springfield	25	Oct. 14, 1871.
Fifth 25 miles west from Springfield	25	Oct. 14, 1871.
Sixth 25 miles west from Springfield	25	Nov. 20, 1882.
Seventh 25 miles west from Springfield	25	Nov. 20, 1882.
First 25 miles west from Isleta, N. Mex	25	Nov. 10, 1880.
Second 25 miles west from Isleta, N. Mex	25	Nov. 10, 1880.
Third 25 miles west from Isleta, N. Mex	25	Feb. 28, 1881.
Fourth 25 miles west from Isleta, N. Mex	25	Feb. 28, 1881.
Fifth 25 miles west from Isleja, N. Mex	25	Mar. 25, 1881.
Sixth 25 miles west from Isleta. N. Mex	25	Apr. 22, 1881.
Seventh 25 miles west from Isleta, N. Mex	25	June 9, 1881.
Eighth 25 miles west from Isleta, N. Mex	25	July 5, 1881.
Ninth 25 miles west from Isleta, N Mex	25	Dec. 1, 1882.
Tenth 25 miles west from Isleta, N. Mex	25	Dec. 1, 1882.
Eleventh 25 miles west from Isleta, N. Mex	25	Dec. 1, 1882.
Twelfth 25 miles west from Isleta, N. Mex	25	Dec. 1, 1882.
Thirteenth 25 miles west from Isleta, N. Mex	25	Dec. 1, 1882.
Fourteenth 25 miles west from Isleta, N. Mex	25	Dec. 1, 1882.
Fifteenth 25 miles west from Isleta, N. Mex	25	Dec. 1, 1882.
Sixteenth 25 miles west from Isleta, N. Mex	25	Dec. 1, 1882.

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Constructed during the year ending June 30:

	Miles.
1871	75
1872	50
1881	175
1882	25
1883	250
Total	575

This road has been constructed west from Springfield, Mo., as far as the Arkansas River, in Indian Territory, and from Isleta, N. Mex., to the Colorado River, but as yet is not a matter of record in the Department, and dates cannot be given further.

REFERENCES.

Report Auditor of Railroad Accounts, 1880, page 51.
Report Commissioner of Railroads, 1881, pages 28, 46.
Report Commissioner of Railroads, 1882, pages 53, 85.

By an agreement, the Southern Pacific is to meet the main line of the Atlantic and Pacific with its Mojave branch at the crossing of the Great Colorado River at a point near the Needles; when completed, the whole line will be operated through via Albuquerque and the Atchison, Topeka and Santa Fé Railroad, upon an agreed traffic basis for a term of years. (Poor's Manual, 1882.)

The following figures show the number of acres of land certified or patented up to June 30, 1883, under act incorporating this road:

Year ending June 30:	
1871	491,912.79
1872	3,131.71
1873	3,669.01
1874	941.13
1875	3,648.78
1876	642.94
1881	23,037.36
Total	526,991.12

Owing to the incomplete state of this road up to the last year, and the expenses attendant upon construction constantly to be met, no intelligent comparison can be made of its operations without going into details too voluminous for a matter of this kind.

The Southern route may be said to comprise the following railroads:

	Miles.
Texas and Pacific, New Orleans to El Paso, Tex	1,163
Southern Pacific, of Arizona, New Mexico, and California; El Paso to Tulare, Cal	1,035
Central Pacific (leased line), Tulare to San Francisco	251
Making a total of	2,439

TEXAS AND PACIFIC.

LINE OF ROAD.

Marshall, Tex., to San Diego, Cal., about 2,000 miles.

The Texas Pacific Railroad Company was incorporated by an act of Congress, March 3, 1871, "An act to incorporate the Texas Pacific Railroad Company, and aid in the construction of its road, and for other purposes." (16 Stat., 573.)

By this act the company was authorized to construct a road from Marshall, Tex., via El Paso, through New Mexico and Arizona, to a point on the Rio Colorado at or near the southeastern boundary of the State of California, thence to San Diego, pursuing in the location throughout, as near as possible, the thirty-second parallel north latitude.

A map of the proposed route of the road from El Paso, Tex., to San Diego, Cal., was filed in the General Land Office September 2, 1871. No point of the line between said points has been definitely located, and no evidence of construction furnished.

Maps of completed sections of road in the State of Texas have been filed with affidavits of the chief engineer, covering part of the line.

For the main line from the—

Louisiana State Line to Dallas ..... 169.12 miles, February 11, 1874.
Dallas to Fort Worth ..... 31.87 miles, January 1, 1877.

The main line has been completed to a junction with Galveston, Harrisburgh, and San Antonio Railway at Sierra Blanca, but no evidence of construction beyond Fort Worth has been furnished the Land Office.

By an act of Congress of May 2, 1872, the name of this company was changed to the Texas and Pacific Railway Company. (17 Stat., 59.)

Prior to the above the company was consolidated with the Southern Pacific Railroad Company (of Texas) March 21, 1872, and with the Southern Transcontinental Railway March 30, 1872.

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The annual report of the president of the company for the year ending May 31, 1875, gives the following:

Gross earnings	$1,183,313 33
Operating expenses	789,803 85
Net earnings	393,509 48
Passengers carried	58,059
Revenue	$239,037 02
Pounds of freight carried	176,690,000
Revenue	$479,997 81
Locomotive engines	29
Passenger cars	18
Baggage, mail, and express	7
Freight cars	350
Stock cars	67
Average number of miles road operated	320.22

On August 11, 1876, the company had in operation the following number of miles of road:

Shreveport, La., to Fort Worth, Tex	221
Texarkana to Sherman	154
Marshall to Texarkana Junction	69
Total	444

Below are given figures taken from the annual reports of the company; the year ends May 31:

Earnings.	1876.	1878.	1880.
Passenger	$397,426 82	$592,694 12	$456,054 82
Freight	1,113,043 70	1,660,645 14	2,053,018 35
Express	12,342 71	24,273 83	22,270 77
Mail	30,574 90	30,979 65	41,622 36
Telegraph	8,543 41	17,437 61	10,920 31
Miscellaneous	2,693 44	5,280 00	5,335 00
Total	1,564,624 98	2,331,310 35	2,589,221 61
Operating expenses	891,882 02	1,448,439 38	1,543,517 75
Net earnings	672,742 96	882,870 97	1,045,703 86
Passengers carried	129,035	245 112	194,788
Revenue	$326,832 62	$592,694 12	$456,054 82
Tons freight carried	138,596	388,967	525,093
Revenue	$729,866 23	$1,660,645 14	$2,053,018 35
Locomotive engines	28	49	52
Passenger cars	19	32	32
Baggage, mail, and express cars	7	11	11
Freight cars	430	813	798
Stock cars	82	164	160
Average number of miles operated	325	.....	.....
Total number of miles operated	333	443.86	443.86

Southern Pacific Railroad

(Leased and operated by the Central Pacific Railroad Company.)

Line of road—San Francisco to El Paso, Tex ..... 1,286 miles.

The Southern Pacific Railroad Company was chartered under the laws of California December 2, 1865, and by its charter and section 18 of the act of July 27, 1866 (14 Stat., 299), it was authorized to construct a railroad and connect with the Atlantic and Pacific near the boundary line of the State of California, and to aid in such construction it was to have similar grants of land to those of the Atlantic and Pacific. The terms of the Congressional act were accepted November 24, 1866, and acceptance filed in the Department of the Interior December 21, 1866 October 11, 1870, this company was consolidated with the San Francisco and San José, the Santa Clara and Pajaro Valley, and the California Southern Company, all of which companies were chartered by the State of California.

The object of this new corporation was to construct and operate a line of railroad from San Francisco to a point on the Colorado River near the southeastern boundary of California, a distance of about 722 miles, with a branch from Tehachapa Pass to Colorado River at or near Fort Mojave, a distance of about 308 miles, and such other branches as the board of directors may decide to establish.

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A map of the main line of road, from San Francisco to the Colorado River, was filed in the General Land Office January 3, 1867.

CONSTRUCTION.

The report of the president of the company, dated August 12, 1873, says: "When the present company was organized there were only 80 miles of road, extending from San Francisco to Gilroy, constructed and in operation."

	Miles.
On August 12, there were	202.5
September, 1874	278
June 30, 1875	342
June 30, 1876	711.51

Made up of the following lines:

	Miles.
San Francisco to Tres Pinos	100.49
Huron, via Goshen, to west bank Colorado River	528.56
Los Angeles to Wilmington	22.06
Carnadero to Soledad	60.40

The records of the General Land Office show affidavits of construction of sections, from which the following is, as near as can be determined, the number of miles constructed during each fiscal year and reported to the Department.

Year ending June 30:	Miles.
1871	30.26
1872	20
1873	20
1874	70
1875	20
1876	140
1877	118.59
1878	160 03
Total	578.88

The following figures showing the number of acres of land that have been certified or patented under grants of July 27, 1866, and March 3, 1871, during each governmental fiscal year up to June 30, 1883, as taken from the records of the General Land Office:

	Act 1866, 14 Stat., 292, sec. 13.	Act 1871, 16 Stat., 573 sec. 23.
1874	5,966.33	.....
1875	394,447.09	.....
1876	285,705.07	41,178.23
1877	22,920.48	.....
1878	230,540.30	.....
1879	11,297.73	54,315.42
1880	1,720.00	.....
1881	85,313.11	5,737.85
1882	.....	3,500.85
1883	2,519.92	.....
Total	1,040,430.03	104,732.35

The tables given below are from the annual reports of the company:

	Earnings.	Expenses.	Net earnings.
October 1, 1870, to June 30, 1871	$430,097 50	$222,427 06	$207,670 44
Year ending June 30, 1872	723,856 01	376,278 11	347,577 90
Year ending June 30, 1873	1,035,311 56	458,739 14	576,572 42

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TRAFFIC AND EQUIPMENT.

	1872.	1873.
Passengers carried	314,150	330.475
Tons of freight carried	120,661	182,661
Average number of miles operated	100	121.6
Locomotive engines	14	19
Passenger cars	28	27
Baggage cars	.....	6
Mail cars	.....	.....
Express cars	.....	.....
Freight cars	227	301
Stock cars	.....	15
Other cars	18	55

EARNINGS.	1874.	1878.	1881.
Passenger	$512,637 53	$477,924 94	$475,443 06
Freight	504,256 42	471,262 72	628,858 30
Mail	13,682 62	10,175 19	12,400 56
Express	18,111 55	17,515 79	12,822 28
Telegraph	2,400 00	3,000 00	3,000 00
Miscellaneous	111,650 22	34,007 94	25,490 58
Total	1,162,738 33	1,013,886 58	1,158,014 78
Operating expenses	463,674 34	514,542 55	587,125 26
Net earnings	699,063 99	499,344 03	570,889 52
Passengers carried	352,544	423,917	480,133
Tons of freight carried	192,567	185,402	278,350
Locomotive engines	19	28	30
Passenger cars	27	51	62
Baggage cars	6	6	11
Mail cars	Not given	Not given	Not given
Express cars	do	do	do
Freight cars	306	560	581
Stock cars	14	19	18
Other cars	55	87	66

During the year 1877 the bridge across the Colorado River was completed and two new corporations were organized for the purpose of forming eastern connections with this road, one under the laws of the Territory of Arizona and the other under the laws of the Territory of New Mexico. These companies began immediately the work of construction. From Yuma, east to Casa Grande, a distance of 182 miles, was in operation by July, 1879; by August, 1880, the road was constructed to within 53 miles of the eastern boundary of Arizona, and March 18, 1881, to a junction with the Atchinson, Topeka and Santa Fé Railroad at Deming, N. Mex.

During the same year it was extended to El Paso, when the same construction force was transferred to the extension east of that point, and by December 1, 1881, the Texas and Pacific track was met at Sierra Blanca, 91 miles east of El Paso.

The line from the Colorado River through Arizona and New Mexico being built and operated under charters from the Territorial governments, accounts for no record of its construction being filed in the General Land Office.

For the same reason no report of its operations is made to the Department, but may be found partly in Poor's Manual.

The Colorado division has been completed from Mojave to the Needles, 240 miles, but no evidence of construction is on file in the Department.

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NORTHERN PACIFIC RAILROAD.

LINE OF ROAD.

Lake Superior to Puget Sound and Portland, Oreg., about 2,000 miles.

Mileage of main line, August 1, 1883:

	Miles.
Duluth to Brainerd, Minn	114
Saint Paul to Brainerd	135.5
Brainerd to Helena, Mont	1,018.5
Helena to Missoula (under construction)	131
Missoula to Wallula Junction, Wash	412
Wallula Junction to Portland, Oreg. (Oregon Railway and Navigation Company)	214
Carbonado, Wash., to New Tacoma, Wash	34
New Tacoma to Kalama, Wash	105.5
Kalama to Portland (under construction)	41
Total (including Oregon Railway and Navigation Company)	2,205.5
Branch lines, total	416.1
Northern Pacific Junction, Minn., to end of track (main line)	25.5

RECAPITULATION.

Main line in operation	1,845		
Main line under construction	....	172	
Oregon Railway and Navigation Company	214		
Branch lines in operation	362.1		
Branch lines under construction	....	54	
Total mileage	2,207.1	226	=2,647.1

(Traveler's Official Guide for August, 1883.)

The Northern Pacific Railroad Company was incorporated by an act of Congress approved July 2, 1864, entitled "An act granting lands to aid in the construction of a railroad and telegraph line from Lake Superior to Puget Sound, on the Pacific Coast, by the northern route." (13 Stat., 365.)

By this act the company was empowered to build a line of road from some point on Lake Superior, in the State of Wisconsin or Minnesota, west on a line north of the forty-fifth degree of latitude, to a point on Puget Sound, with a branch to Portland, Oreg.

The conditions of said act were accepted by the company December 17, 1864, and acceptance filed in the Department of the Interior December 30, 1864.

The first map of definite location of a part of the main line was filed in the General Land Office November 21, 1871, "From a Junction with the Lake Superior and Mississippi River Railroad in Sec. 7, T. 48 N., R. 16 W., Minnesota to the Red River of the North."

The sections of the main line completed, and the dates of the affidavits of the chief engineer of the company showing construction, as filed in the General Land Office, are as follows:

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	Distance.	Date.
	Miles.	
First. From the junction with the Lake Superior and Mississippi River Railroad to the Red River of the North	228	Oct. 5, 1871.
Second. From Kalama to Tenino, Wash	65	Aug. 15, 1873.
Third. From the Red River of the North to the Missouri River in Dakota Territory	196.4	Oct. 7, 1873.
Fourth. From Tenino to Tacoma, Wash	41.1	Mar. 5, 1874.
Fifth. From Missouri River to a point 100 miles west	100	July 12, 1880.
Sixth. From point last named to the Little Missouri River, in Dakota Territory	50	Sept. 3, 1880
Seventh. From the 150th to the 225th mile west of Missouri River	75	July 20, 1881.
Eighth. From the 225th to the 250th mile west of Missouri River	25	Oct. 15, 1881.
Ninth. From Wallula Junction, Wash., to the 200th mile-post, near Eight-Mile Prairie, Idaho	200	Aug. 24, 1881.
Tenth. From the point above to the 225th mile-post	25	Nov. 16, 1881.
Eleventh. From the 250th to the 350th mile-post west of the Missouri River	100	Apr. 17, 1882.
Twelfth. From the 350th to the 375th mile-post west of the Missouri River	25	July 11, 1882.
Thirteenth. From the 375th to the 400th mile-post west of the Missouri River	25	July 24, 1882.
Fourteenth. From a point in section 1, township 48 north, range 17 west, Minnesota, to a point in section 32, township 49 north, range 13 west, in the city of Superior, Wis	25	July 24, 1882
Fifteenth. From the 400th to the 425th mile-post west of the Missouri River	25	Aug. 10, 1882.
Sixteenth. From the 425th to the 450th mile-post west of the Missouri River	25	Aug. 25, 1882.
Seventeenth. From the 225th to the 275th mile-post east of Wallula Junction	50	Sept. 16, 1882.
Eighteenth. From the 275th to the 390th mile-post east of Wallula Junction	25	Sept. 20, 1882
Nineteenth. From the 450th to the 500th mile-post west of the Missouri River	50	Oct. 27, 1882.
Twentieth. From the 500th to the 525th mile-post west of the Missouri River	25	Nov. 9, 1882.
Twenty-first. From the 300th to the 325th mile-post east of Wallula Junction	25	Nov. 21, 1882
Twenty-second. From the 525th to the 550th mile-post west of the Missouri River	25	Nov. 28, 1882.
Twenty third. From a point in the city of Bismarck, Dak., to a point on the west bank of the Missouri River in the southwest quarter of section 26, township 139 north, range 81 west of the fifth principal meridian, being the bridge across the Missouri River and the approaches thereto (connecting Nos. 3 and 5.)	4,584	Nov. 28, 1882.
Twenty-fourth. From the 550th to the 600th mile-post west of the Missouri River, about one mile west of Gallatin River, Montana	50	Mar. 20, 1883.
Twenty-fifth. From the 325th to the 350th mile-post east of Wallula Junction.	25	Apr. 5, 1883.
Twenty-sixth. From the 600th to the 625th mile-post west of the Missouri River	25	Apr. 21, 1883
Twenty-seventh. From the 350th to the 375th mile-post east of Wallula Junction, or to a point on the Pend d'Oreille River near the mouth of the Jocko River	25	Apr. 27, 1883.
Twenty-eighth. From the 625th to the 650th mile-post west of the Missouri River	25	June 4, 1883
Twenty-ninth. From the 650th to the 675th mile-post west of the Missouri River, or to a point about six miles east of Helena, Mont	25	June 4, 1883
Thirtieth. From the 375th to the 400th mile-post east of Wallula Junction, or to a point about two and a half miles west of the summit of the Coriacan defile, where the line of the road crosses the boundary of the Flathead Indian Reservation	25	June 4, 1883

Taking the foregoing dates, the following statement shows the number of miles of the main line constructed each fiscal year:

Year ending June 30:

	Miles.
1872	228
1874	302.5
1881	150
1882	425
1883	529.584
Total	1,635.084

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A large construction force is at present employed, and it is expected that the gap between Helena and Missoula will be built and in operation some time this month.

Under the act of July 2, 1864, the following number of acres of land have been certified or patented:

Year ending June 30:

1873	374,885.76
1874	368,607.68
1881	2,896.78
Total to June 30, 1883	746,390.22

A general description of the route of this road as proposed at that time may be found in Poor's Railroad Manual for 1873-'74, pages 393 to 396.

ROLLING STOCK.	1873.	1874.	1875.
Locomotive engines	72	75	77
Passenger cars	20	23	21
Baggage and mail cars	6	6	25
Freight cars	1,525	1,639	1,583
Other cars	25	25	132

The road being in course of construction, no report of the operations was given for above years.

"On the first of January, 1874, the company defaulted on the interest on its bonds, and in April, 1875, the entire property was placed in the hands of a receiver. During the year the road and franchises were sold under a decree of foreclosure, and purchased by a committee of bondholders. On the 29th of September, 1875, the assenting bondholders organized, elected a board of directors, and agreed to convert their bonds into stock." (Poor's Manual, 1876-'77, page 394.)

The first report of the directors of the road after the reorganization of the company was made September 27, 1876, and from it and reports made since that time the following matter has been collected:

The property in possession of the company September 27, 1876, consisted of the completed road, its equipment and working materials, being 230 miles in Minnesota, from Fargo to Thomson Junction, and one-half interest in the track of the Lake Superior and Mississippi Railroad, from Thomson Junction to Duluth, 25 miles, and 195 miles in Dakota, from Fargo to Bismarck, and 105 miles in Washington Territory, from Kalama to Tacoma; in all, 555 miles of railroad in operation.

The equipment of the road was 48 locomotive engines, 22 passenger cars, 34 express, baggage, and caboose cars, and 1,196 freight cars, besides hand, construction, and tool cars.

The lands acquired up to that date and to be acquired aggregated some 10,000,000 acres.

In addition the company held a controlling interest in the stocks of the Saint Paul and Pacific Railroad Company, the Lake Superior and Puget Sound Company, and the Tacoma Land Company; also extensive docks and properties in Duluth.

The gross earnings for the eleven months ending August 31, 1875, were $739,745.51; operating expenses, $449,719.27; net earnings, $290,026.24.

For earnings and expenses of this road for several years see reports of the Auditor of Railroad Accounts, 1879, page 277, and 1880, page 325; also see reports of the Commissioner of Railroads for 1881, page 271, and for 1882, page 272.

ROLLING STOCK.	1879.	1880.	1881.	1882.
Locomotive engines	55	71	104	158
Passenger cars	23	29	48	70
Baggage, mail, and express	11	15	15	29
Freight cars	1,262	1 470	2,716	4,269
Stock cars	41	41	205	489

besides special cars, construction cars, pile-drivers, &c.

The following statement for the eastern division is for the company's fiscal year ending August 31, 1882:

Average number of miles of road operated	797
Increase over last year	213
Gross earnings per mile of road	$6,318.85
Number of passengers carried	297,680
Average distance traveled by each passenger (miles)	115.3
Average fare per passenger	$3.84
Tons of freight carried	655,075
Average haul per ton (miles)	267.60

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The records of the General Land Office show that the following number of acres of land have been certified or patented under the act of July 2, 1864, during the several fiscal years specified:

Year ending June 30:

1873	374,885.76
1874	368,607.68
1880	2,896.78
Total to June 30, 1883	746,390.22

A thorough inspection of the properties of the company was made last year, an account of which will be found in the report of the Commissioner of Railroads for 1882, pages 36 to 42, inclusive, and 80 to 83, inclusive.

CONCLUSION.

Reference to amendments to the original laws incorporating the Pacific railroads, and subsequent acts affecting said roads, will be found in Appendix M, page 58, of the report of the Auditor of Railroad Accounts for 1878.

The total number of acres of land certified or patented to each of the roads under all acts up to June 30, 1883, is as follows:

Union Pacific	1,954,523.08
Union Pacific, account Kansas divisions	963,714.03
Union Pacific, account Denver Pacific	164,721.51
Central Pacific	780,879.40
Central Pacific, account Western Pacific	446,230.65
Atlantic and Pacific	526,991.72
Southern Pacific	1,040,430.03
Southern Pacific, branch line	104,732.35
Northern Pacific	746,390.22

A full statement of the entire line owned and operated by the above railroad companies will be found in the reports of the Commissioner of Railroads as referred to in the body of this statement.

By direction and in the absence of the Commissioner,

Very respectfully,

THOS J. WALKER,
In charge of Office.

Hon. H. M. TELLER,
Secretary of the Interior.

ORDNANCE OFFICE,
WASHINGTON, *April* 29, 1884.

Publication authorized by the SECRETARY OF WAR:

S. V. BENÉT,
Brigadier General,
Chief of Ordnance.

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